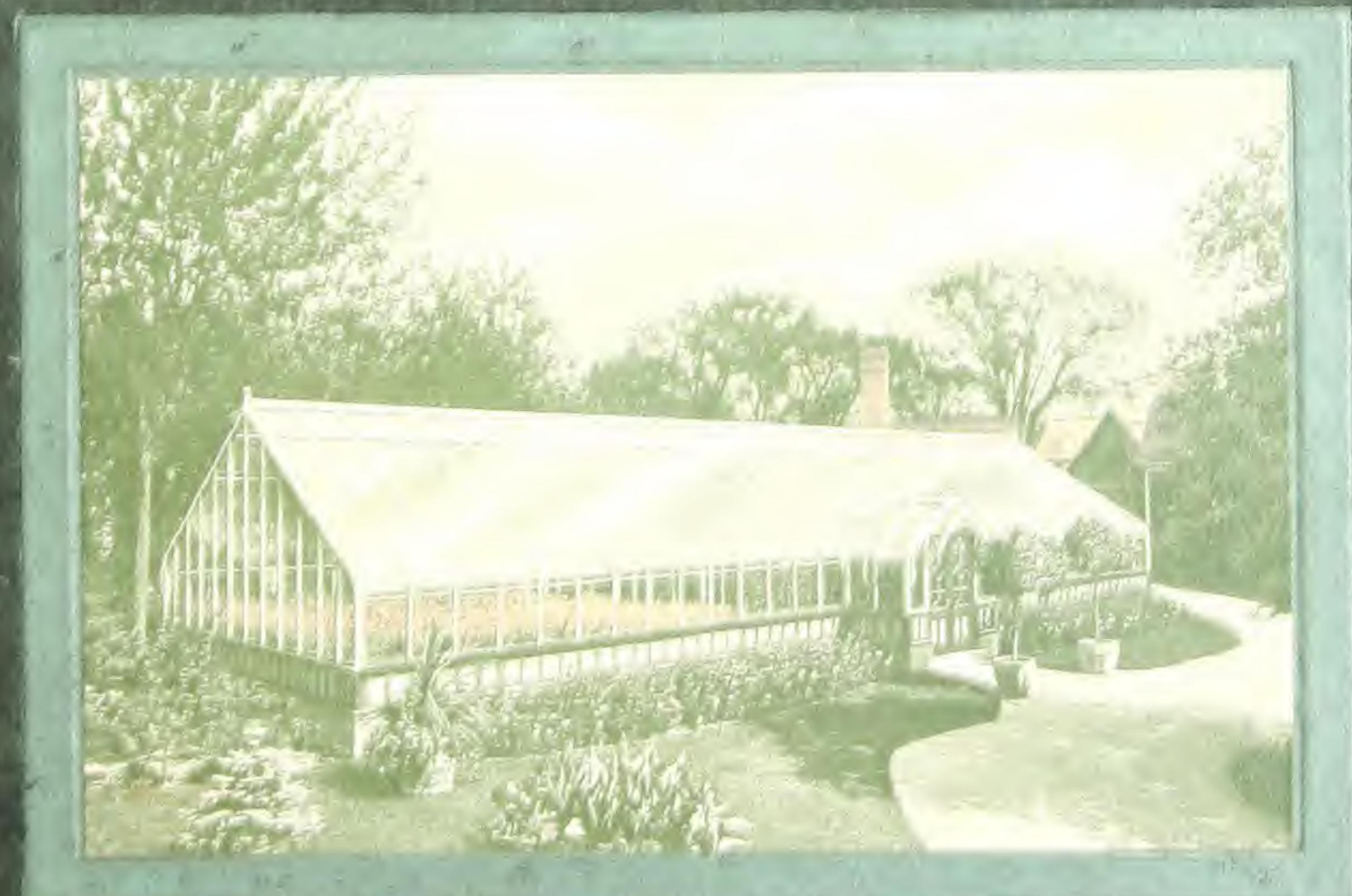


U-Bar
Greenhouses





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893



Copyright 1906
Pierson U-Bar Company
New York.

Catalog of U-Bar --- **Greenhouses** ---



Designed and Built by
Pierson U-Bar Company

Metropolitan Building : : Fourth Avenue
and Twenty-third Street : : New York

Why the U-Bar?



THE essence of all plant growth is light; the more light, the quicker and more abundant the plant growth.

For years greenhouse builders have been striving for lighter houses, realizing that all other things being equal, the house admitting the greatest amount of light, gave correspondingly greater returns, whether it be of flowers, fruits or vegetables.

It is not so long ago when all greenhouses were constructed with heavy wooden sash bars, rafters, and supports, and were glazed with narrow glass eight to ten inches wide.

Various improvements were made from time to time, which gradually led up to the introduction of the present form of the wood capped iron frame construction, in which are used iron rafters, purlins, gutters, sills and other structural members, some of which are capped with wood to prevent expansion and contraction of the iron frame; the wooden sash bars still being retained but made smaller and spaced to receive glass sixteen inches wide.

This construction while a great improvement still left many things desired in the way of lightness, durability, attractiveness and cost of maintenance.

To more fully meet these exacting requirements, the U-Bar form of construction was conceived, the result being that the U-Bar house is as far in advance of the best type of the wood capped iron frame house, as it was of its predecessors.

In the U-Bar construction we encase the wooden sash bar with a galvanized steel U-shaped bar; the combined members being no larger than the smallest wooden sash bar used in other constructions.

Owing to their great strength we are enabled to eliminate all the heavy iron rafters and many lateral supports, to place the bars farther apart, permitting the use of glass twenty-four inches wide, while by bending the bars at the eaves line and using curved glass at this point we eliminate all cumbersome gutters, plates, posts and other shading members, resulting in a structure of extreme lightness and great strength.

The steel covering of the wooden bars eliminating interior woodwork with its tendency to decay—the galvanizing of all steel members preventing rusting,—the use of the wooden core bar preventing injurious expansion and contraction of the structure and consequent glass breakage,—the method of bedding the glass assuring tightness,—the aluminum finish reducing repainting to a minimum,—all combine to produce a structure of wonderful durability and low cost of maintenance.

The extreme lightness of construction, the wide glass, the absence of all heavy shading members, assures unusual productiveness.

The curved eave line, the aluminum finish of the interior, the absolute simplicity of the construction produces a structure unmatched in attractiveness and adaptability.

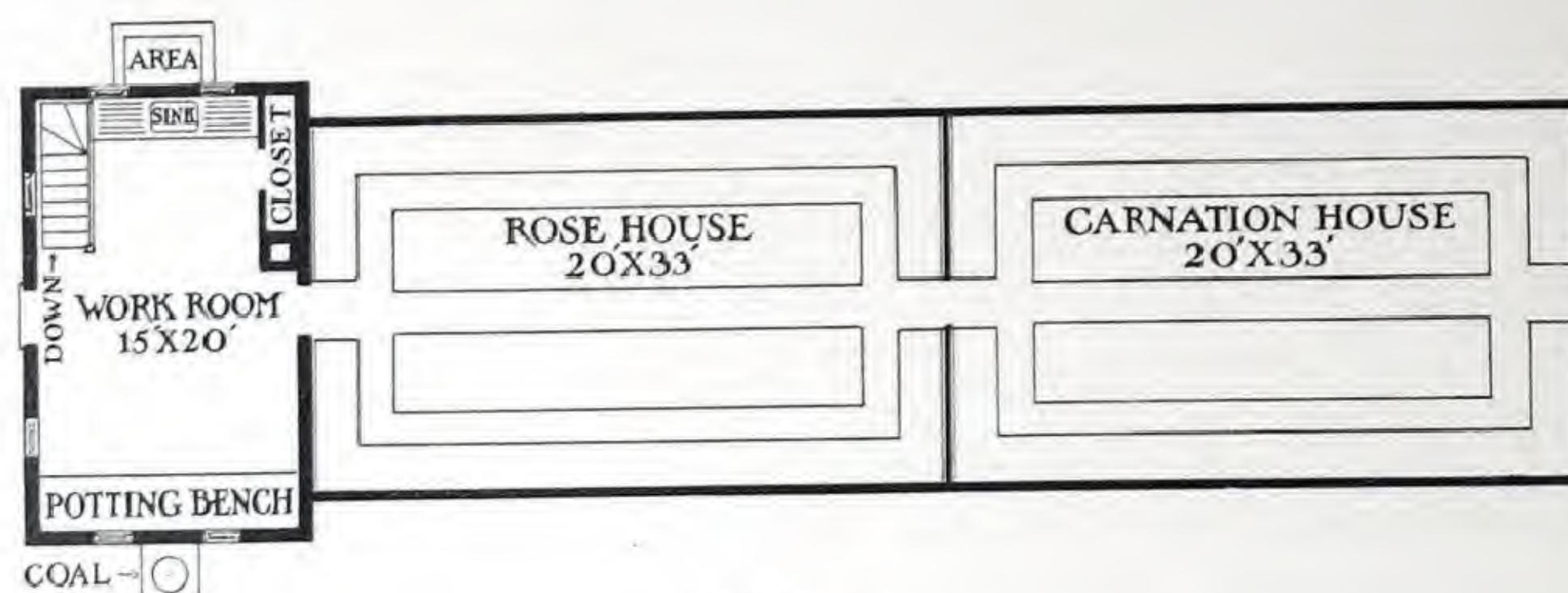
U-Bar greenhouses represent the highest development of greenhouse construction excelling as they do in strength, lightness, simplicity, durability, adaptability, attractiveness, productiveness and low cost of maintenance.

You will find on pages 34 and 35 the U-Bar described in detail, both as to construction and application. Index will be found on page 71.

PIERSON U-BAR COMPANY
Metropolitan Building
4th Ave., & 23rd St., New York.

Subject One

Erected at Orange, N. J.



Plan

FOR a greenhouse for general purposes, there is no better type than the full span house.

The one here shown is a simple, attractive house of this character divided into two compartments, one being used for roses, the other for carnations. They could be used equally successfully for the cultivation of many other varieties of flowers, also for fruits or vegetables. A roomy and handily arranged workroom at the end, with the boiler and coal storage placed in the basement, is a very convenient adjunct.

A house of this character can be readily extended in a direct line or wings can be joined at either side of the workroom.

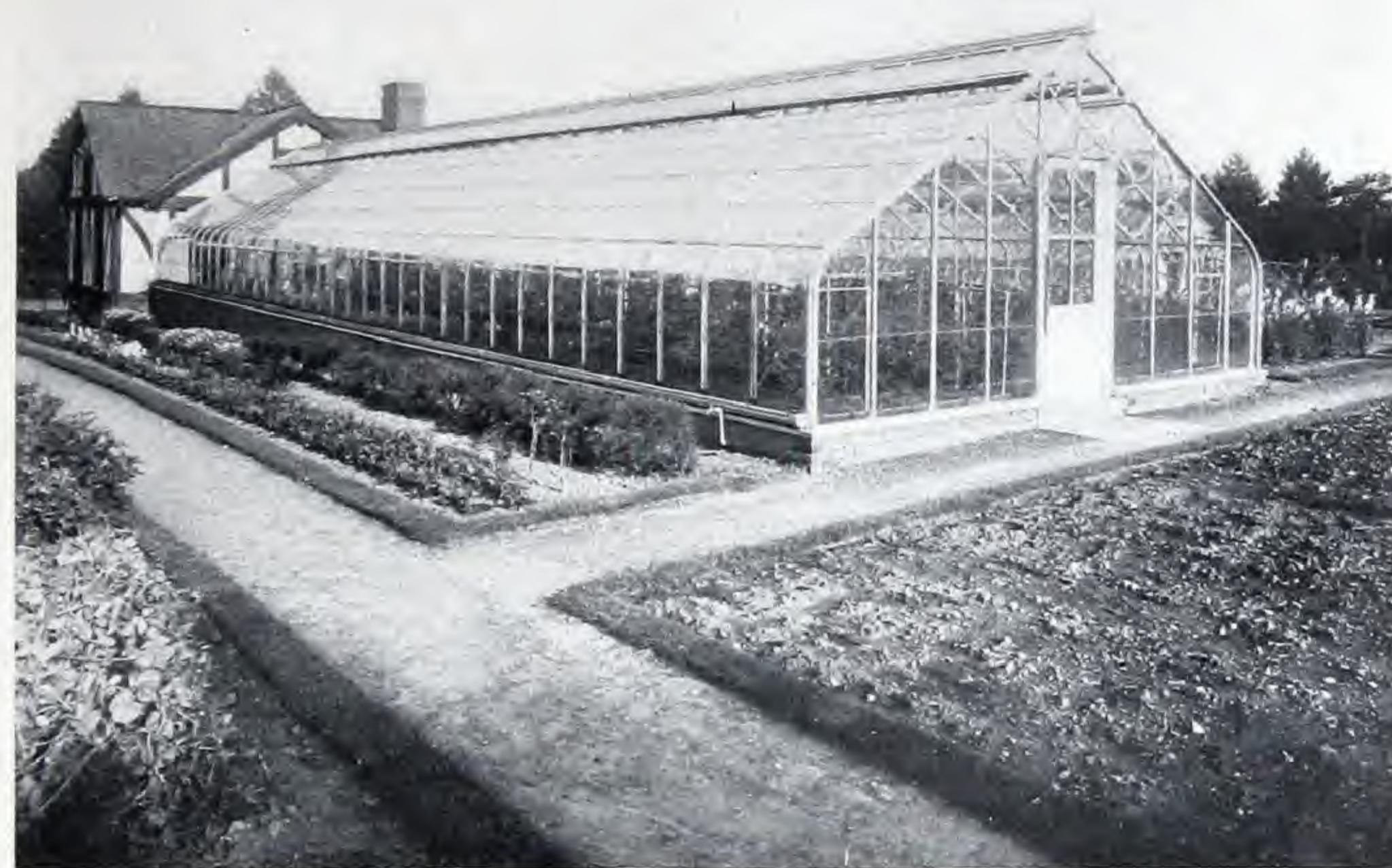
Cross section "H" page 39 shows the general construction of a similar house somewhat wider.



How attractively it fits in
this garden scheme.



Subject One — *Continued*



This gives a good idea of the pleasing effect of the curved eave line and the snug workroom at the end.

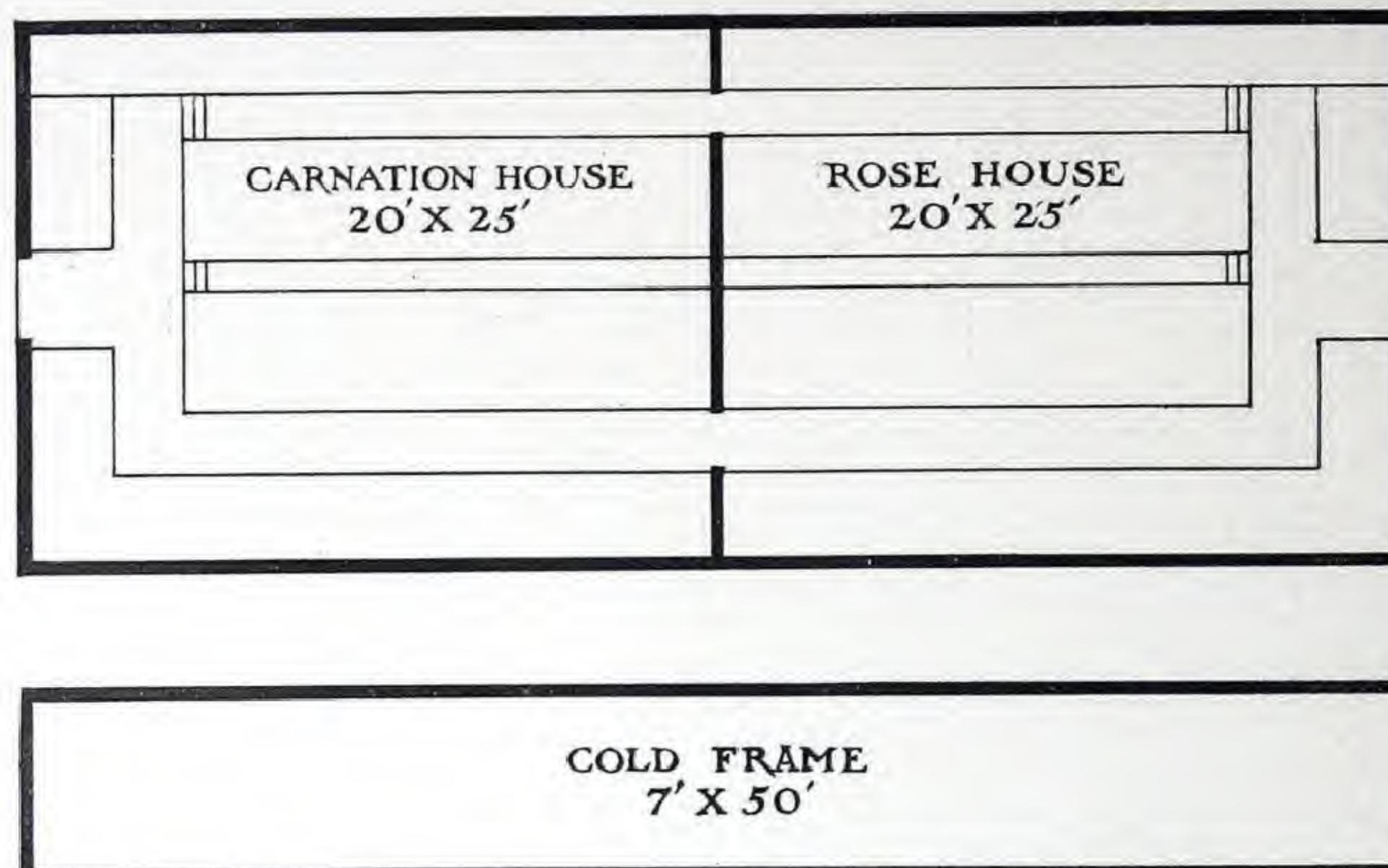


Interior of rose house looking down center path towards workroom.



Subject Two

Erected at Elberon, N. J.



Plan

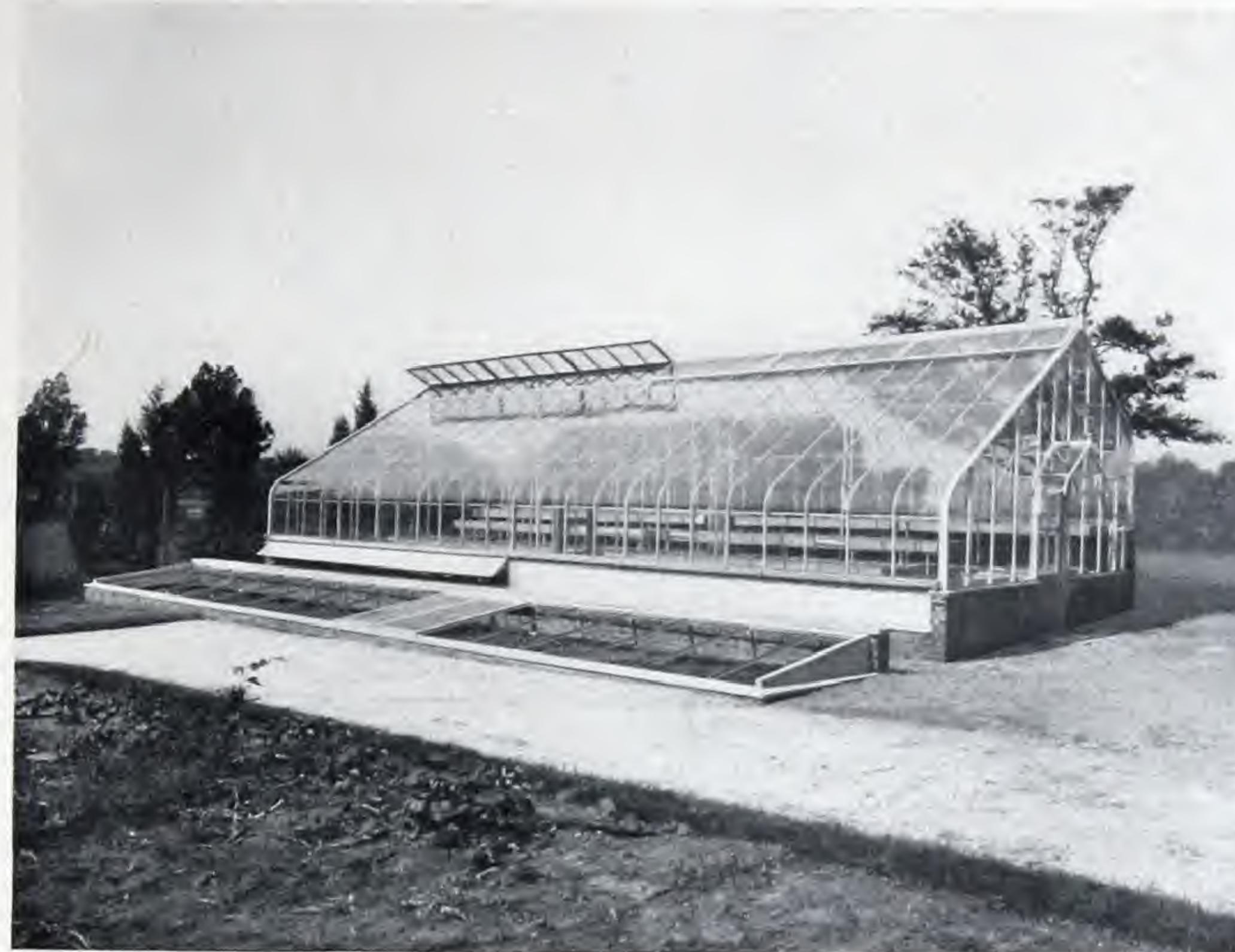
THIS is one of our three-quarter span houses especially designed to face south. Dividing the house into two compartments makes possible two temperatures which greatly increases the varieties of flowers and vegetables that can be grown. The heated cold frames just in front practically add another compartment to the house for raising vegetables, violets, pansies, etc.

In this case the boiler is situated in the basement of an adjoining building just out of sight at the right. However, the potting room could just as well be added on either end placing the boiler in the basement.

For the general construction of this house, see cross section "I" page 40 and for the cold frame, see cross section "A" page 37.



Subject Two — *Continued*



Note the airiness of this house, its absence
of heavy structural parts.

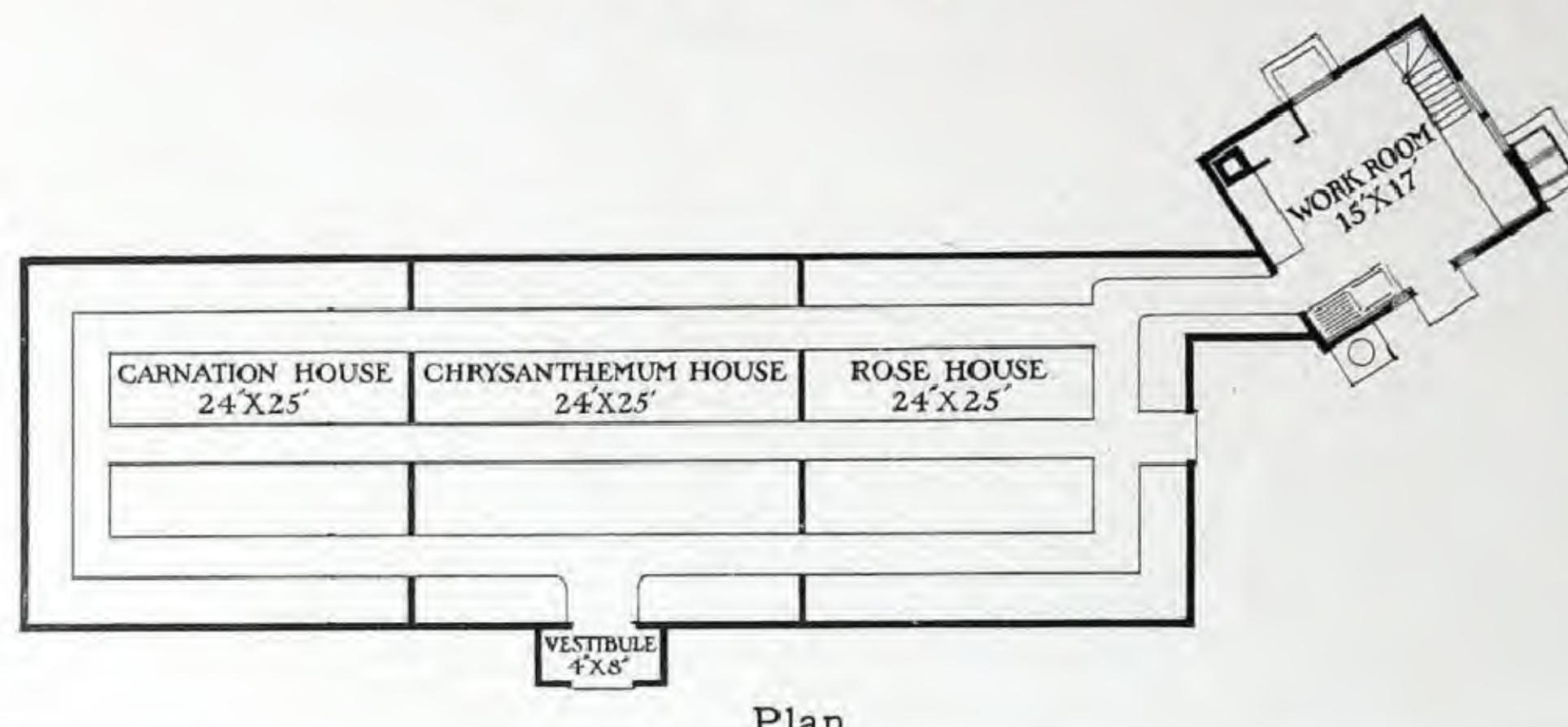


This view of the house was taken on purpose to show its extreme
lightness and give you an idea of the bench arrangement.



Subject Three

Erected at Schenectady, N. Y.



WHAT a prominent yet charming feature of the grounds this greenhouse is.

How full of suggestions the first glimpse as you come up the drive!

The potting house just inside the gate connects at the corner of the greenhouse with a glass passage way.

This especial arrangement was made to conform to the entrance and the line of the drive. A latticed enclosed yard just without the gates, screens any unsightly debris.

The greenhouse is 75 feet long by 24 feet wide divided into three compartments each 25 feet long, used for growing plants requiring different temperatures: a compartment for roses, chrysanthemums, and carnations. Along with these are grown other flowering plants suited to the various temperatures.

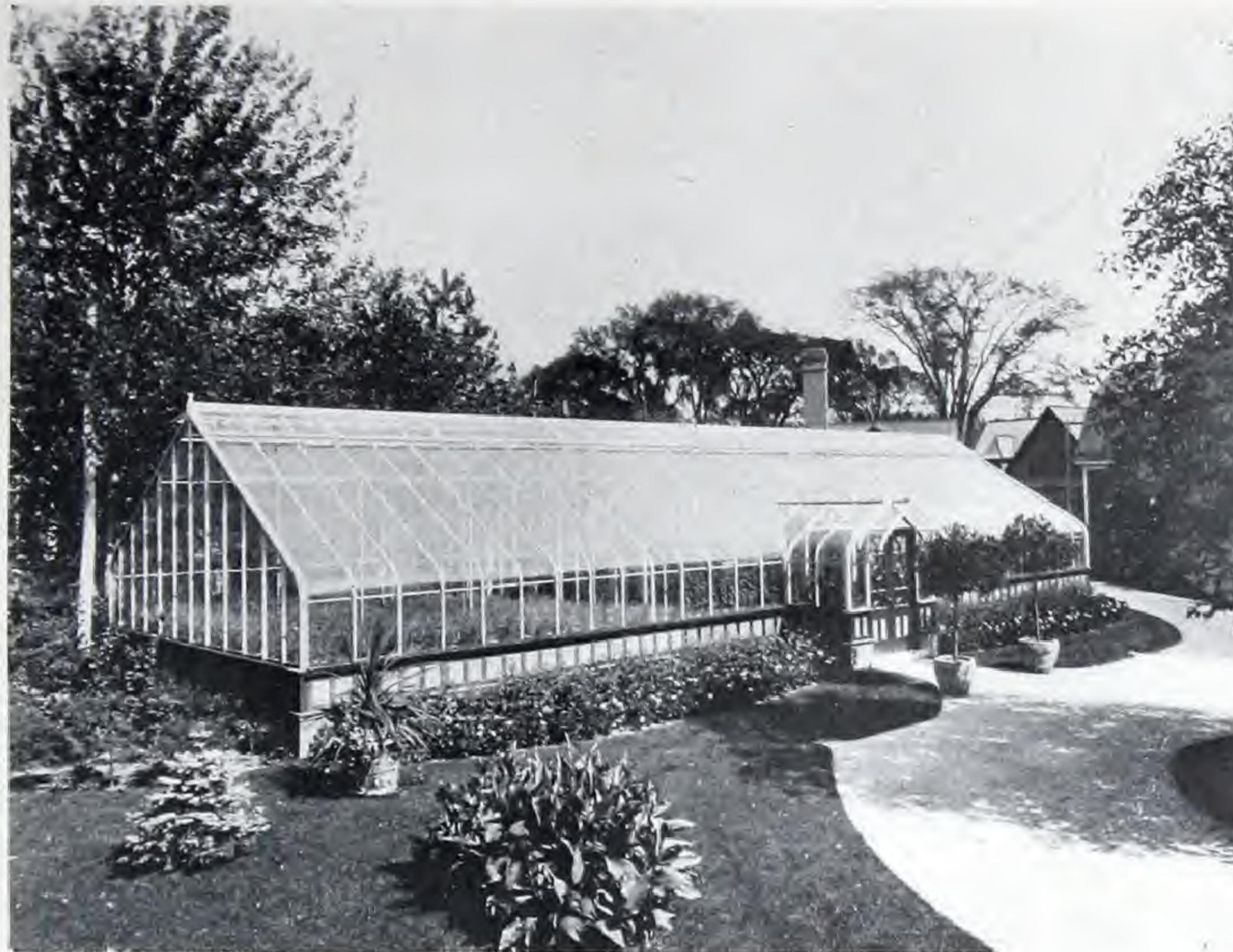
Every bit of bench room is made productive. As each flower has filled its mission, it is followed by others.

Cross section "H" page 39 shows the general construction of such a house.



How artistically and practically this problem has been met.
How pleasing the general conformity.

Subject Three—*Continued*



Looking from the dwelling just across the drive. The vestibule entrance adds a note of ornateness.

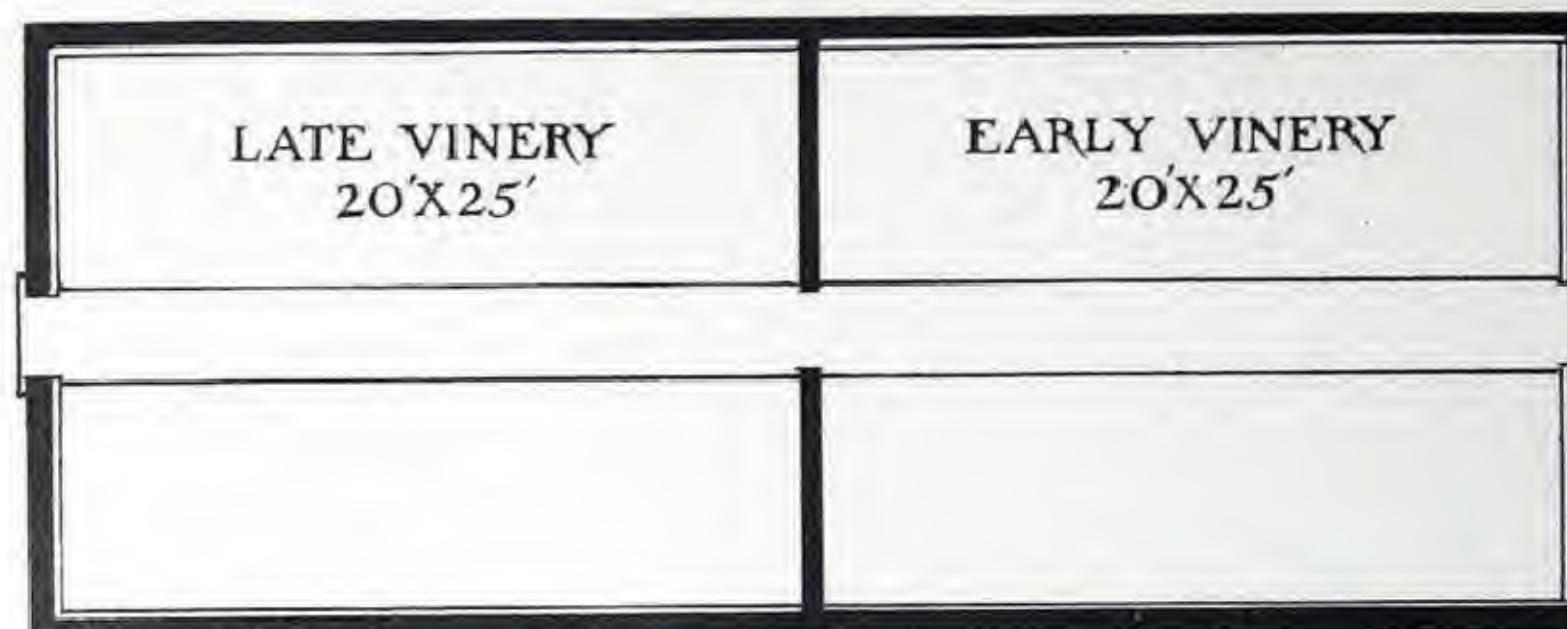


The extreme lightness of construction is apparent. It seems almost a bubble of glass, even the partitions are barely noticeable.



Subject Four

Erected at Millbrook, N. Y



Plan

GRAPES for Christmas! That sounds tempting. Grapes in cluster bunches of several pounds each. Over a quarter of a ton from the sixteen vines planted in this fifty foot house.

As an alternative, supposing you wanted grapes in May. Then start forcing them about December tenth, or by adding another compartment, you can readily have grapes from May fifteenth through to the holidays.

This little vinery is heated for the growing of early and intermediate crops. This picture was taken about six months after planting, and of course the vines have not yet reached the fruiting stage but certainly show vigorous growth for so short a time.

The vines intended for permanent use are planted along the sides of the house and trained on wires along the roof. Those in pots will fruit a bit in advance of the main vines and will be dispensed with when the permanent vines commence bearing.

Peaches and nectarines can be grown equally well in such a house.

The boiler is here again located in an adjoining building. It is the general impression that an attached workroom for the boiler, etc., is a greenhouse necessity but you can just as well heat and work it from a nearby building, although a workroom attached is undoubtedly more convenient.

Cross section "L" page 42 shows a cross section of a similar vinery only wider. Cross section "M" shows a house equipped for growing peaches or nectarines.



Subject Four—*Continued*



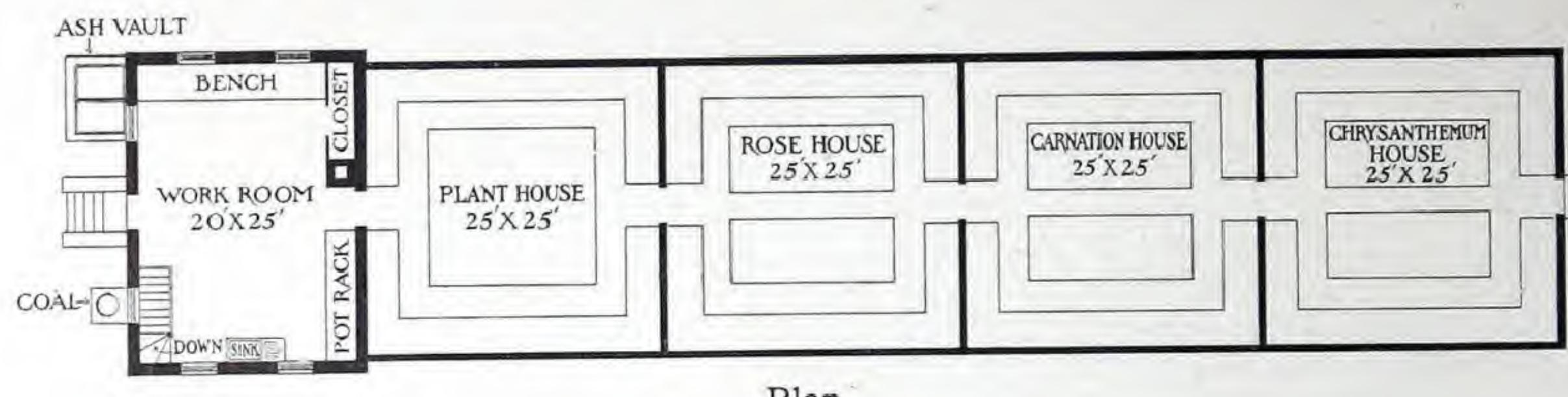
How different from the usual greenhouse in its freedom from hard unattractive lines.



A veritable glass enclosed arbor showing a season's growth of vines.

Subject Five

Erected at Morristown, N. J.



ONE hundred feet of flower joy possibilities! A house with four compartments for roses, carnations, chrysanthemums and general plants.

Along with these, it is possible with a house thus arranged, to raise many other flowering favorites besides quantities of vegetables from crispy lettuce to the luscious melon.

This is as desirable a type of house as it is possible to build.

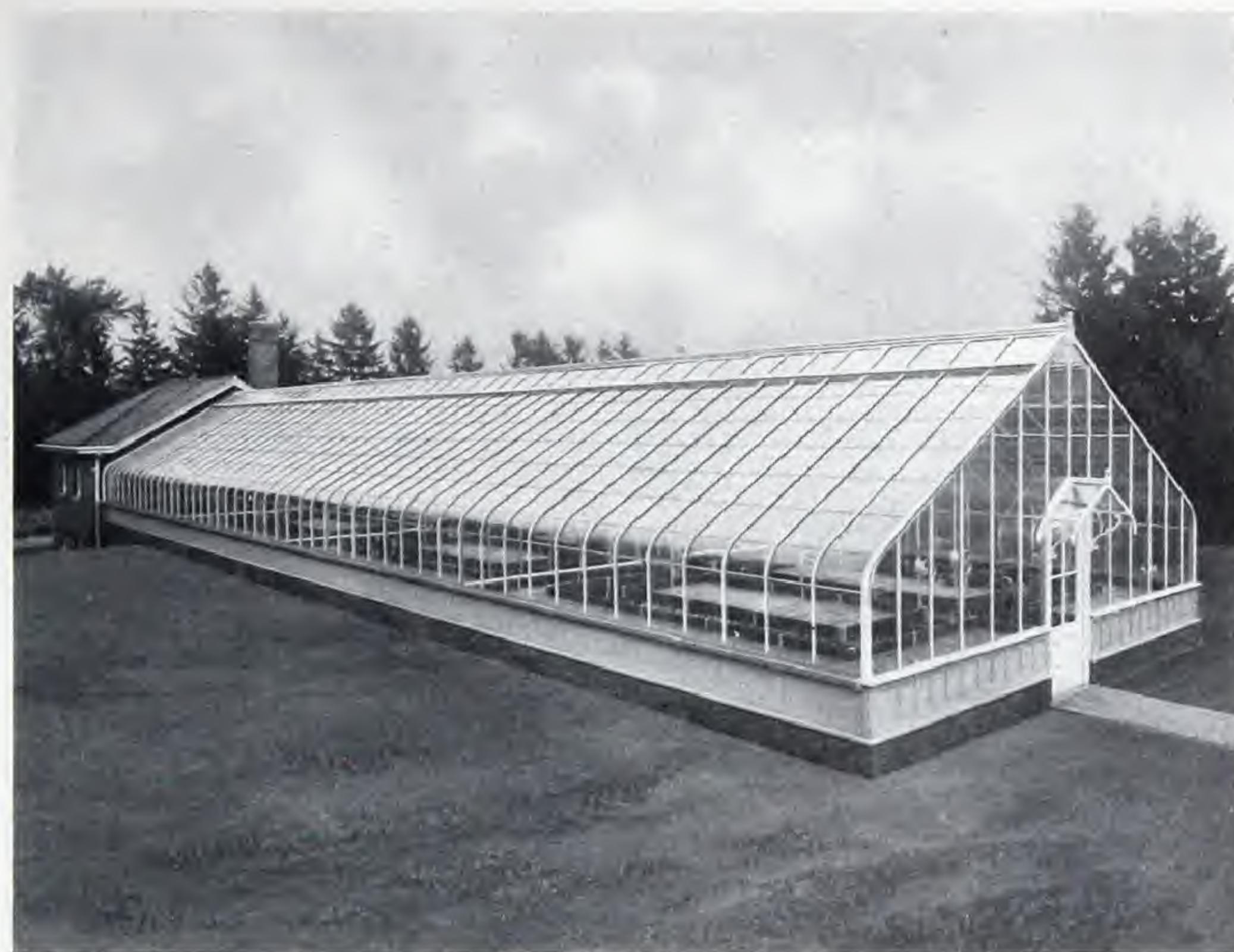
Section "H" page 39 shows the mechanical cross section of such a house.



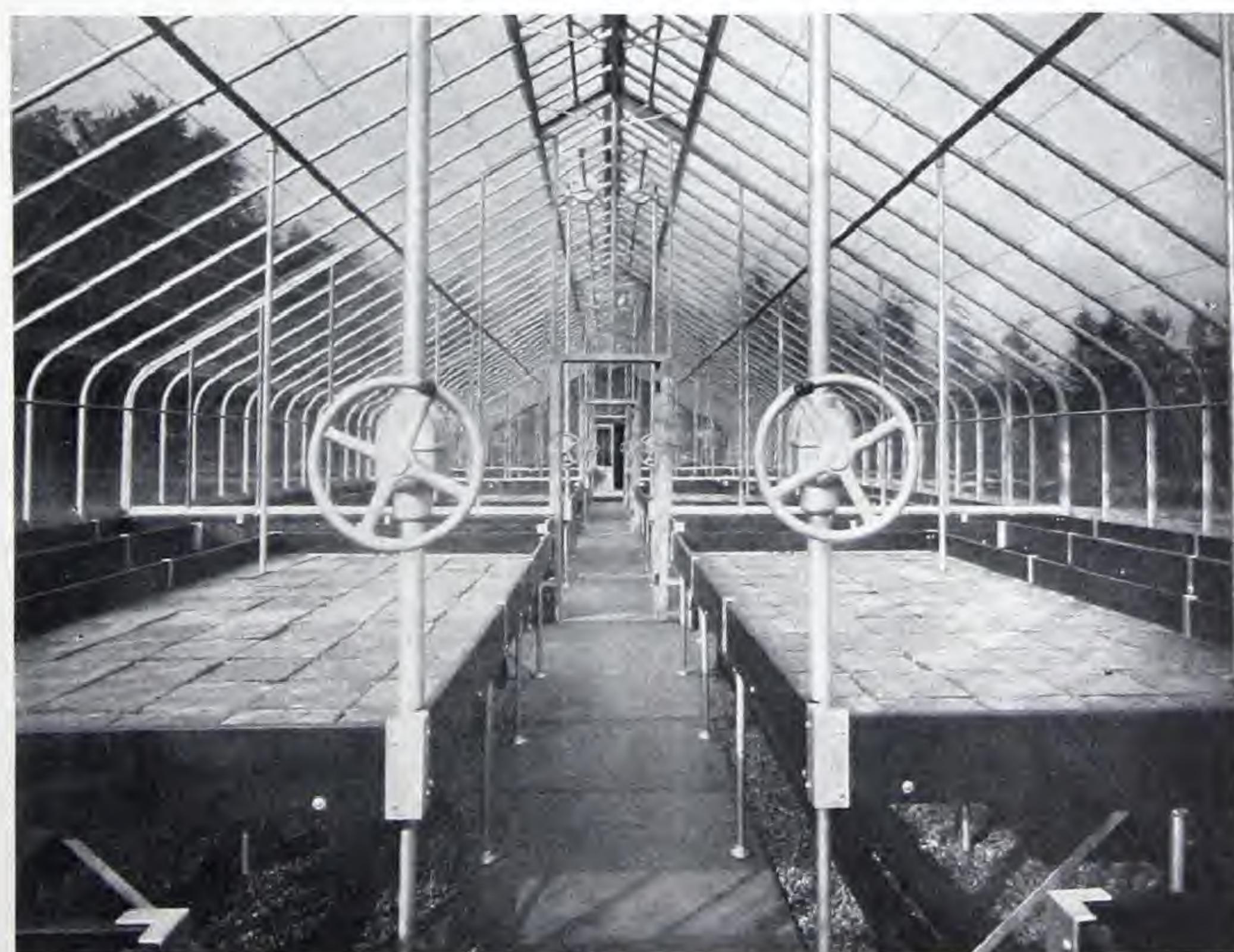
A very practical workroom with brick walls and tile roof. Ample in size and conveniently arranged.



Subject Five—*Continued*



An especially efficient form of greenhouse. Placing its various compartments in direct succession, makes a house easy to work and economical to maintain.

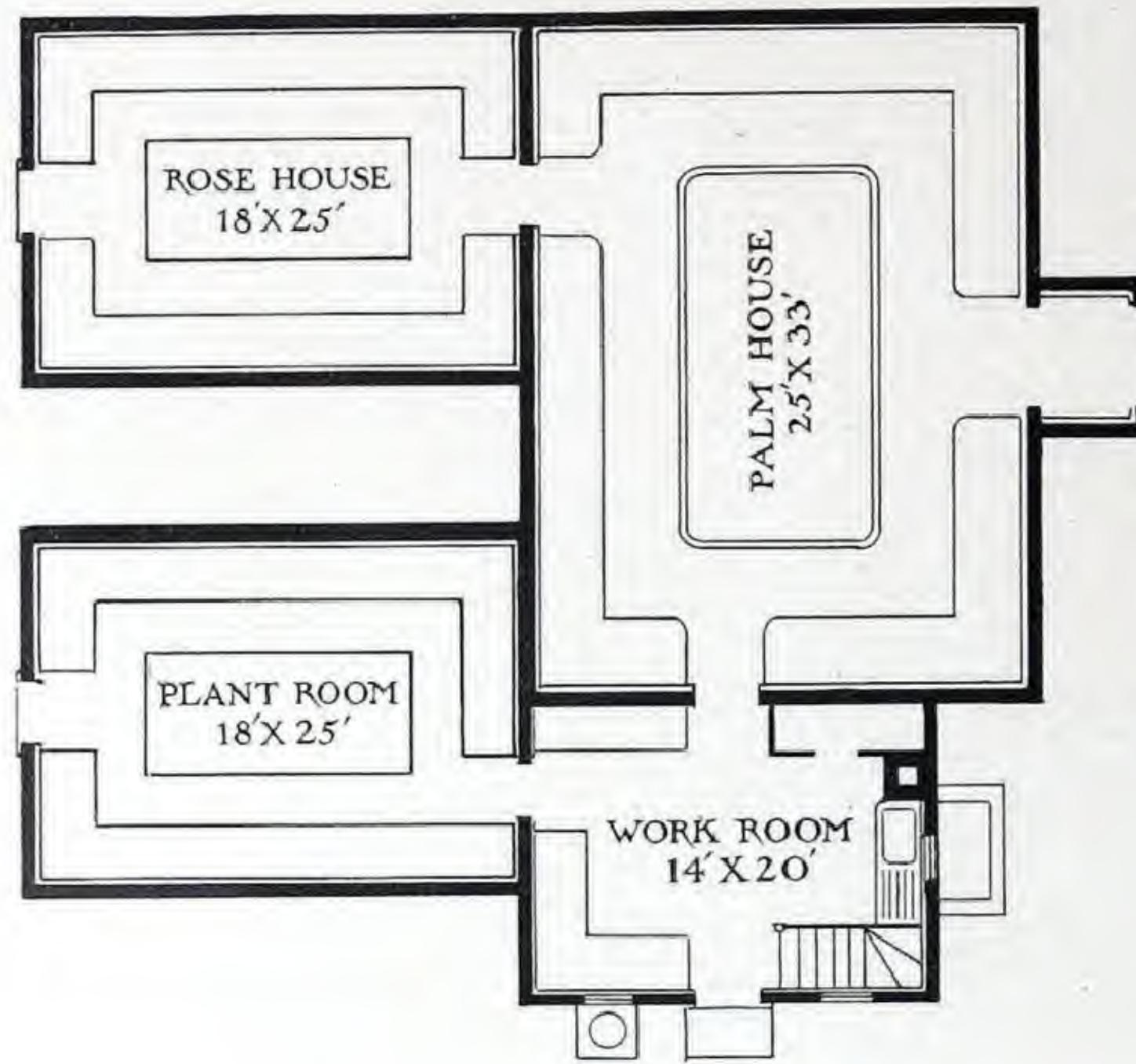


Notice the indestructable character of this interior equipment with the galvanized iron framed, slate sided, tile bottomed, plant beds.



Subject Six

Erected at Plainfield, N. J.



HERE is an arrangement of palm, two general greenhouses, and workroom that fits into a ground scheme in a most charming way. One of many possible combinations of palm house and growing houses. The placing of the workroom as shown permits of economical heating and insures convenient caring for the houses.

See section "G" page 39 for cross section of rose house and plant room. Section "P" page 45 for general construction of palm house.



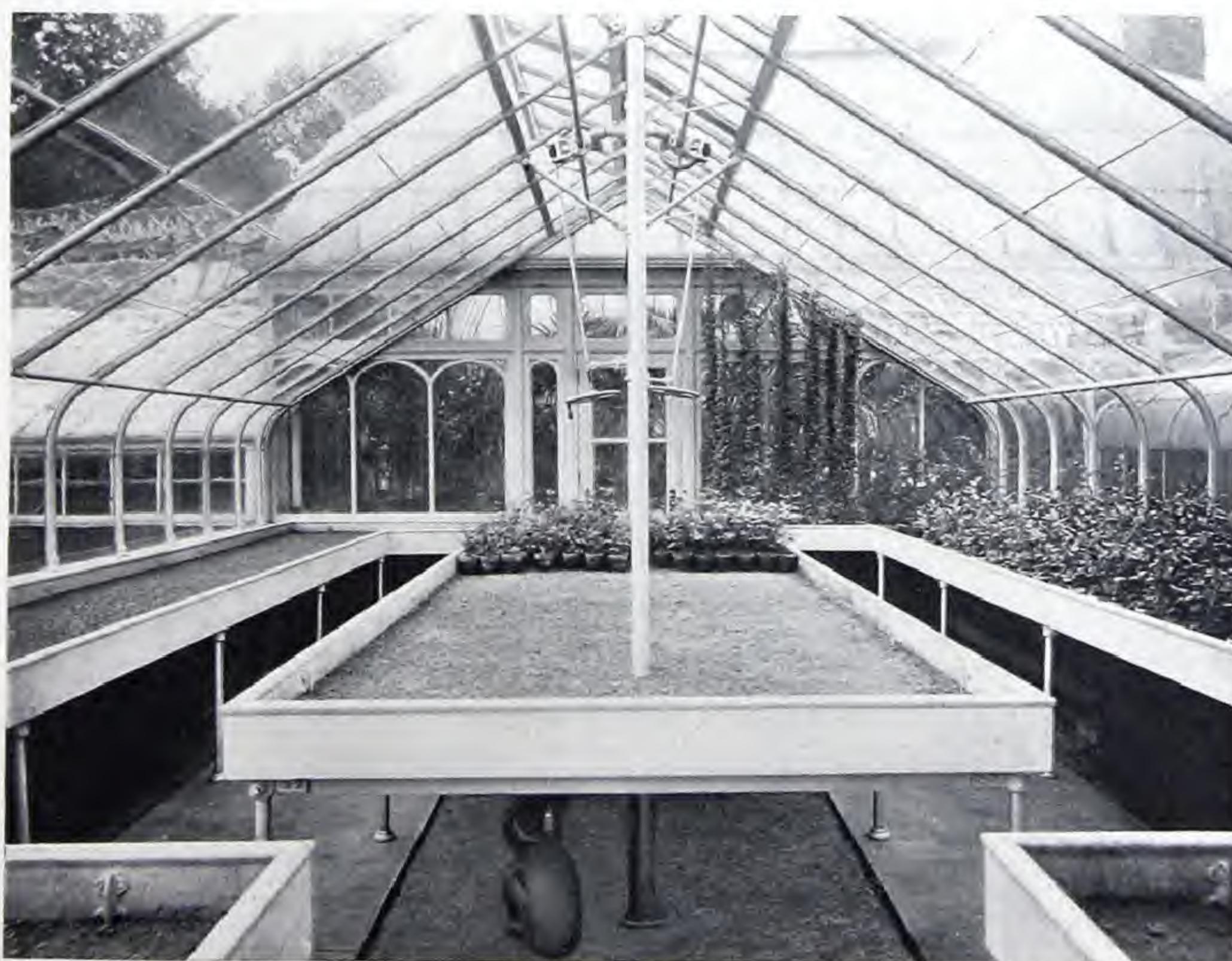
One end of the plant room with its profusion of foliage and bloom. The orchids in their wooden baskets are suspended from the roof.



Subject Six — *Continued*



Bounded by the beautiful garden, broad lawn and curved drive, this greenhouse completes a very carefully laid out scheme.

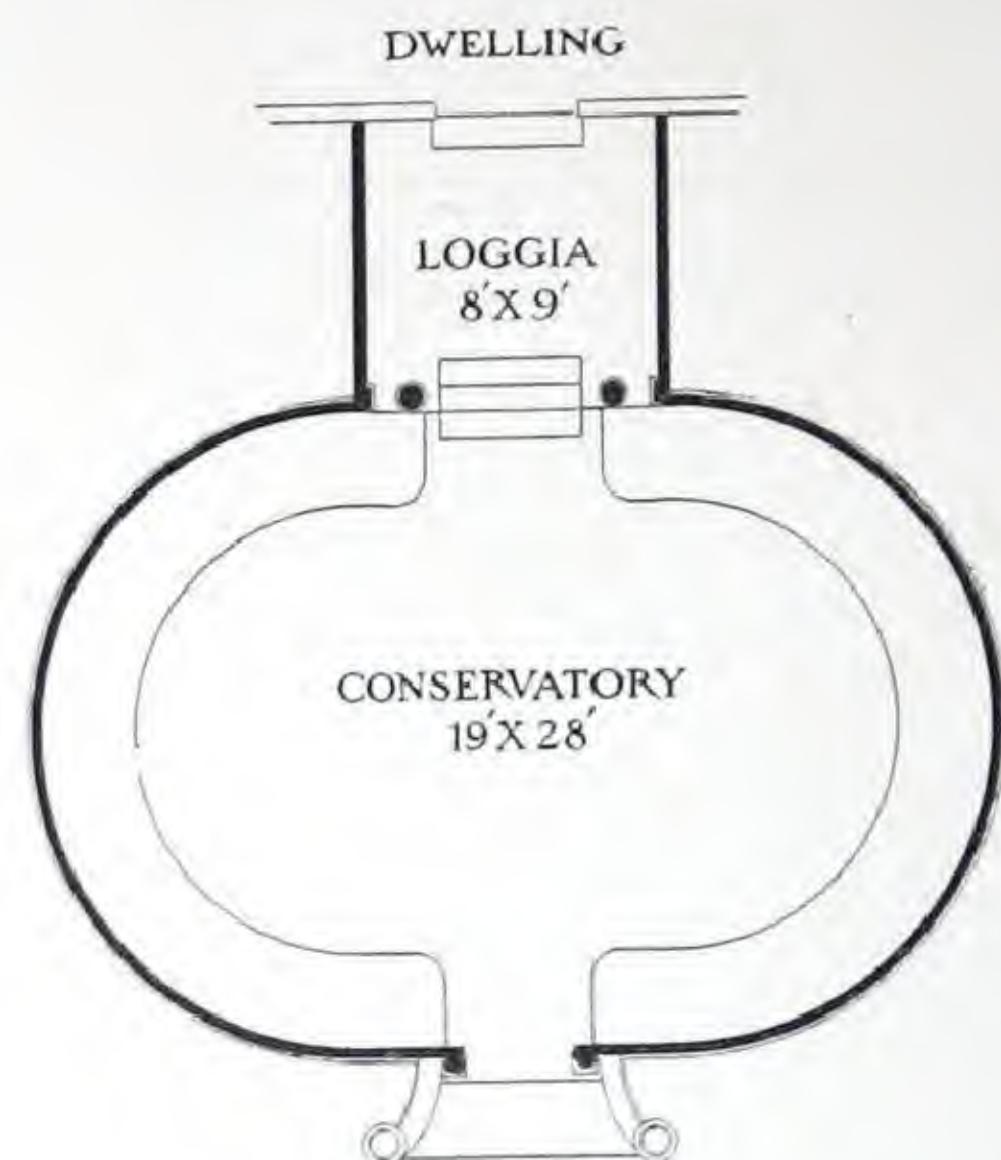


This shows the rose house adjoining palm house giving a very good idea of the lightness of construction and completeness of equipment.



Subject Seven

Erected at Orange, N. J.



Plan

FROM the library, you pass through the loggia into the conservatory which the owner keeps constantly filled and beautified with the best specimens of bloom and foliage from his nearby greenhouse, thus bringing to his very door-step his plant favorites, at their very best, for the continual enjoyment of his family and friends.

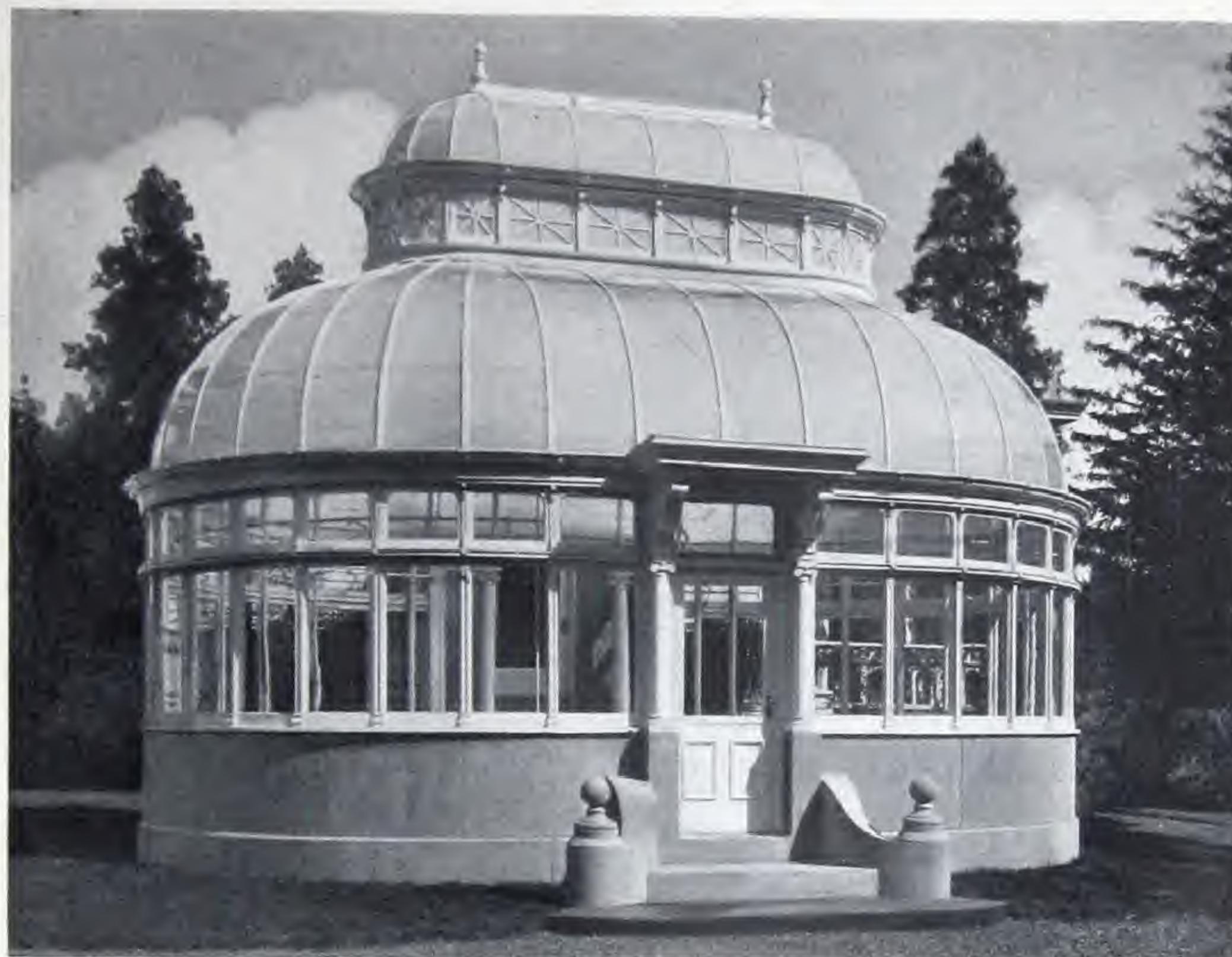
Cross section "P" page 45 shows the general character of the construction of such a house but much wider.



Showing the inviting connection between the conservatory and the dwelling.



Subject Seven—*Continued*



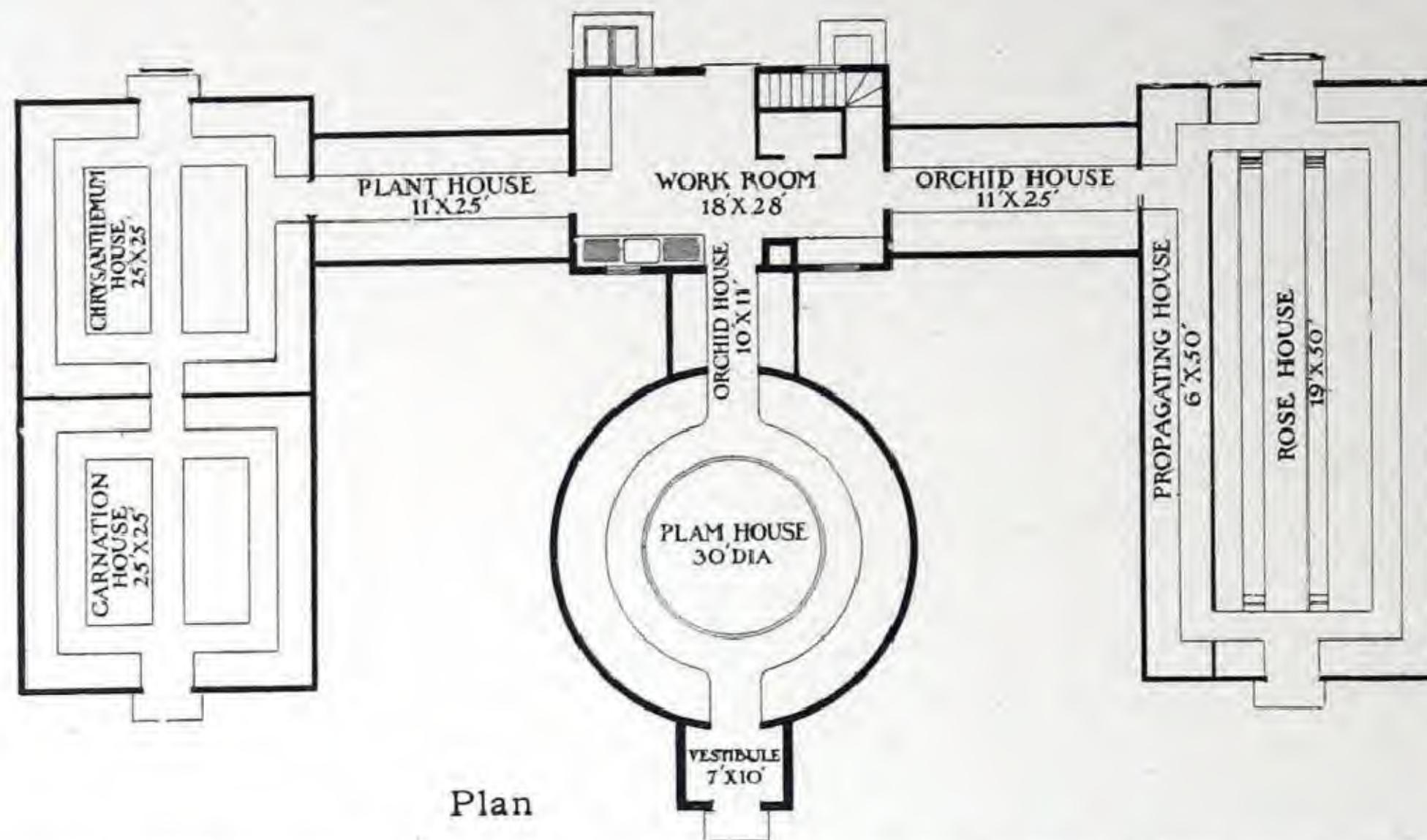
How pleasing this conservatory is, with its simple graceful lines.
What an enjoyable adjunct to the modern home.



This view was taken just after completion and shows the structural effects.
Heating pipes under the plant tables are concealed
behind the lattice work.

Subject Eight

Erected at Madison, N. J.



A SOMEWHAT pretentious scheme, complete in itself but so planned and arranged that future additions may be made while in no way destroying its balance.

The palm house is connected to the work room with a glass passage.

On either side of the work room extend minor houses connecting it with the wings. The south wing is divided into compartments, one for rose growing and the other for propagating. The north wing is devoted to chrysanthemums and carnations.

Many other varieties are grown in this range both of flowers, fruits, and vegetables.

For mechanical cross section of palm house, see "P" page 45, for rose and propagating houses "J" pages 40, chrysanthemum and carnation houses "H" page 39, plant and orchid houses "F" page 38.



The work room with wing connections, showing the palm house dome just behind.
[18]



Subject Eight—*Continued*



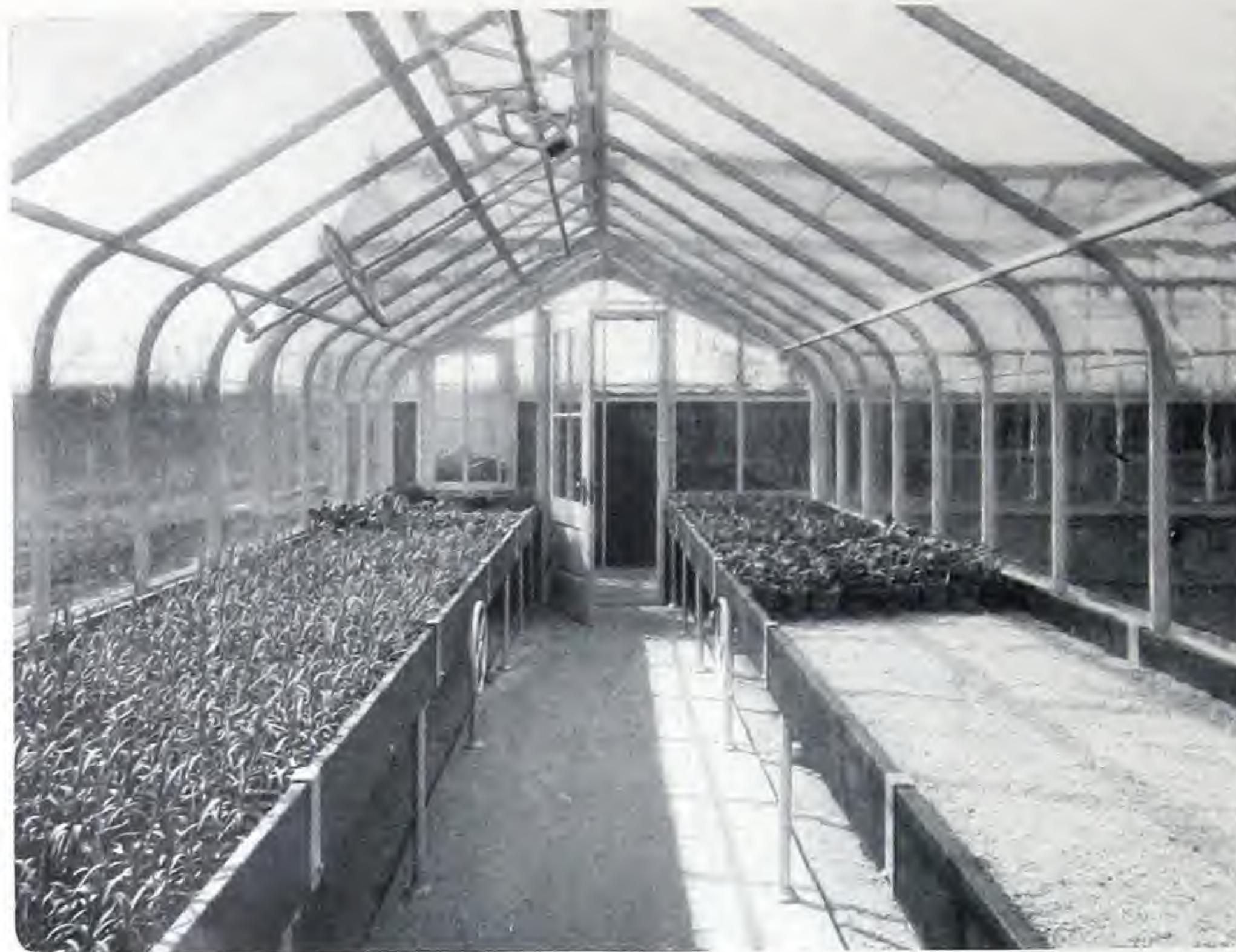
A general view with the palm house as the central feature.



This is the view as you come up the driveway.



Subject Eight—*Continued*



Interior of the connecting houses which are very useful and efficient for many purposes.



One of the wing houses planted with cauliflower as a temporary crop.

Subject Eight—*Continued*



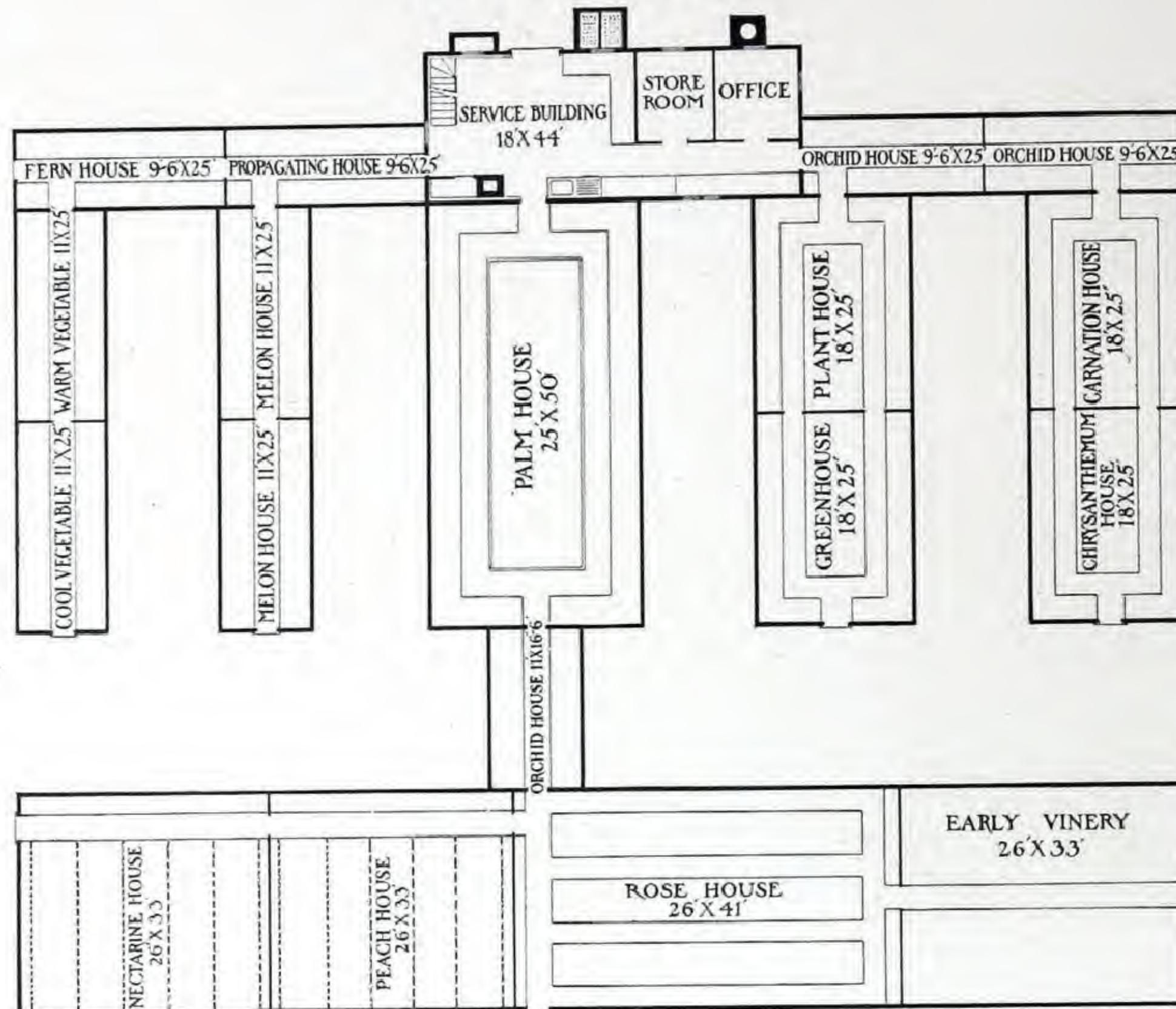
The rose house showing the glass partition separating the propagating house. Preceding the planting of the roses, a crop of string beans was grown.



Interior of palm house looking toward the workroom. For the way this house looked two months later, see cut on page 70.

Subject Nine

Erected at Lenox, Mass.



THIS is an extensive range covering wide cultural possibilities. Aside from these varieties designated on the plan are grown quantities of bedding plants for the beautifying of the grounds and an endless variety of rare plants; azaleas, lilies, cyclamens, hydrangeas, and all sorts of plants, fruits and vegetables, covering a long list of greenhouse favorites.

For cross section of lean-to orchid, propagating and fern houses see section "E" page 38.

Cross section of melon and vegetable houses "F" page 38.

Palm house section "N" page 43.

Plant house, chrysanthemum and carnation houses section "G" page 39.

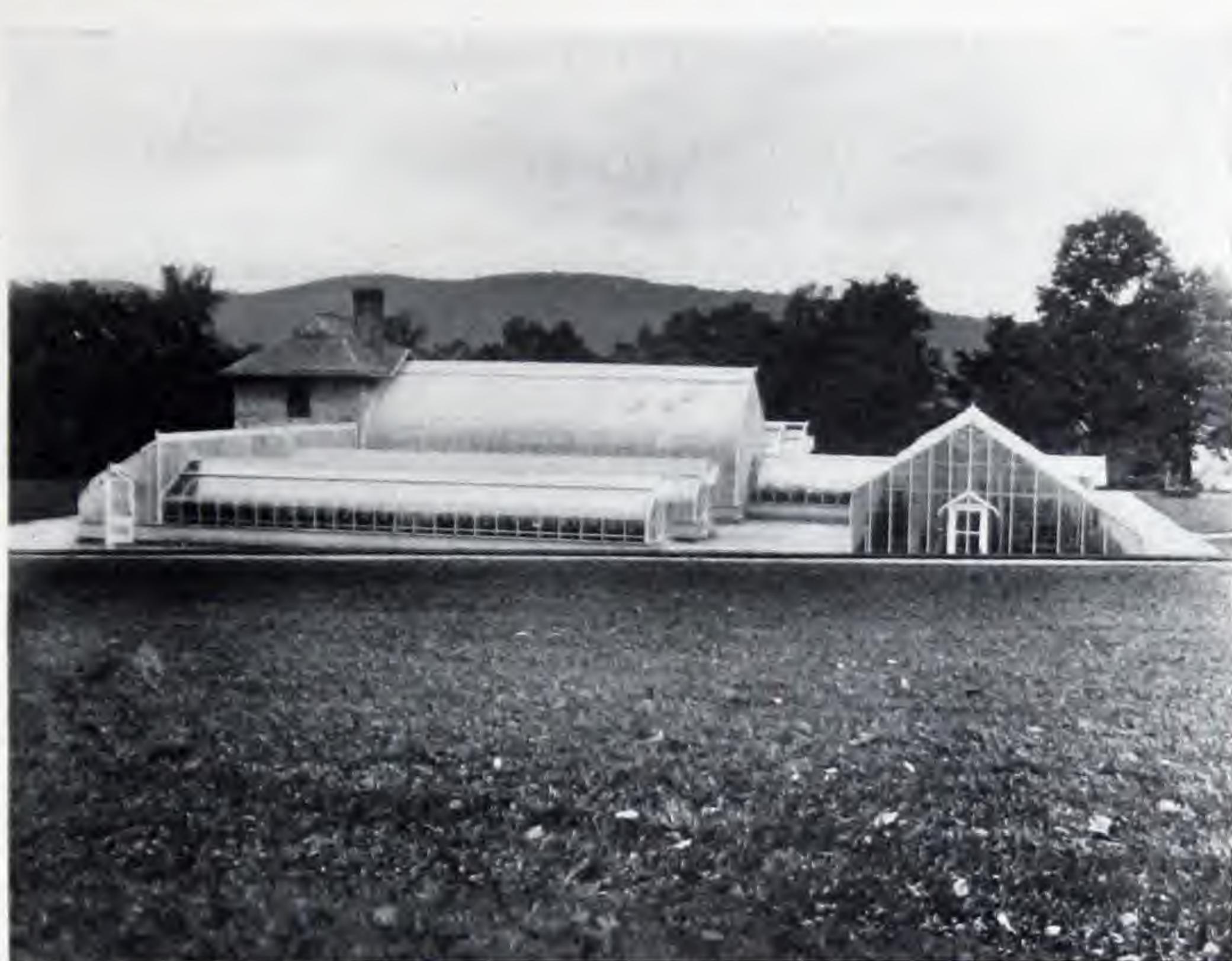


Palm house interior six weeks after completion. The large plants yet to be placed.



These peaches and nectarines show the first year's growth. They will begin to fruit next season.

Subject Nine—*Continued*



Side view of the range taken from a distance.



You would not imagine this house to be the one shown in the top picture at the right. From this view you can form a better idea of the size of the range.

Subject Nine — *Continued*



Note how luxuriantly these roses are growing in this wonderfully light house.



The carnation house with the plants just beginning to bud.



Subject Nine—*Continued*



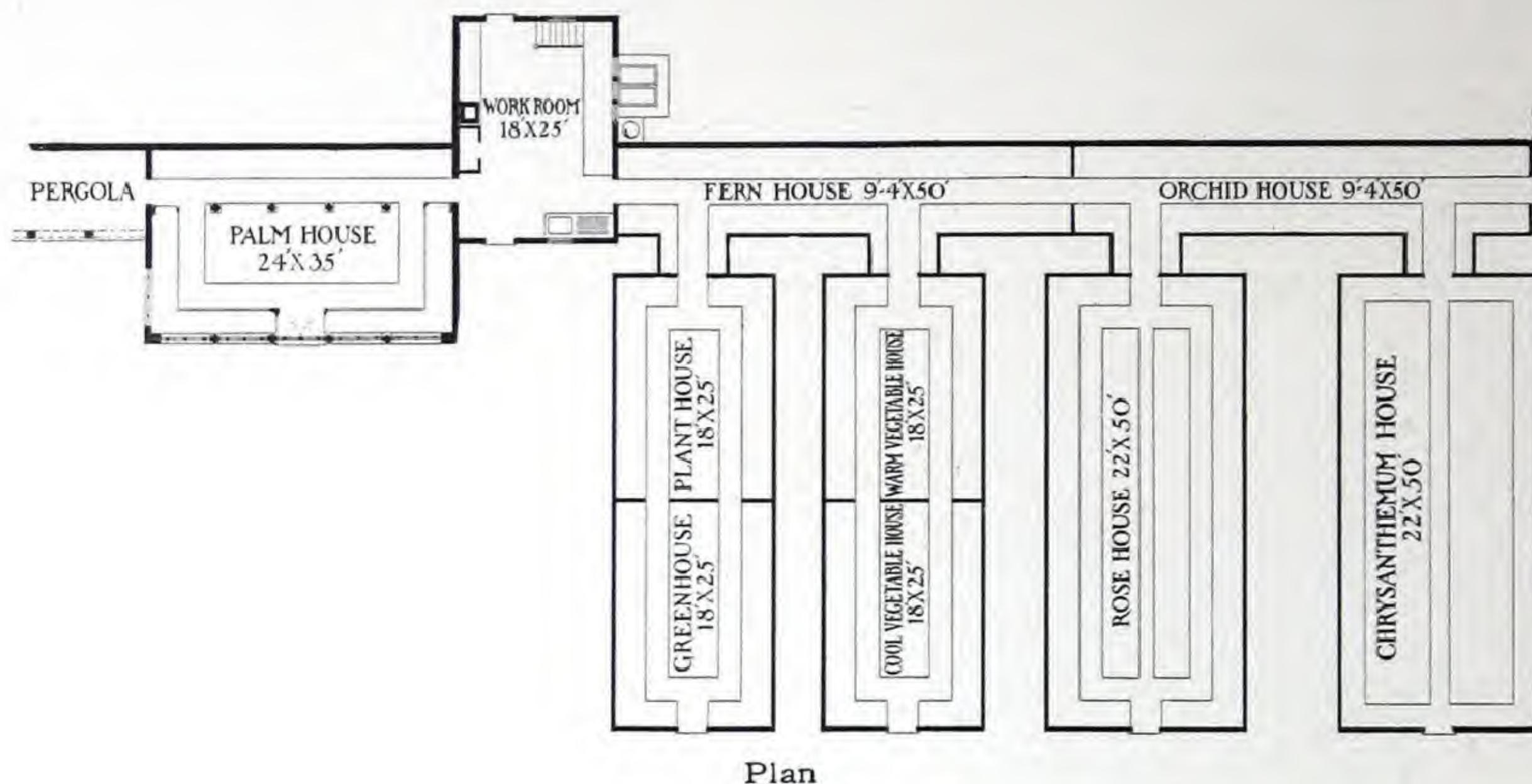
One of the lean-to houses as used for orchids.



The three-quarter span vinery. Next year these vines will begin to fruit.

Subject Ten

Erected at Rochester, N. Y.



THIS is a striking instance of the intimate linking of residence, terrace and greenhouses.

The beautiful palm house forms the culminating point of the terrace, while the range of houses beyond are a delightful background of sweeping curves and airy construction.

Whether it be from terrace, lawn or garden, these houses are perfect in their architectural conformity.

For cross section of fern and orchid houses, see section "E" page 38, rose and chrysanthemum house, section "H" page 39, greenhouse, plant house and vegetable house, sections "G" page 39.



Orchid house



Palm house

Subject Ten—*Continued*

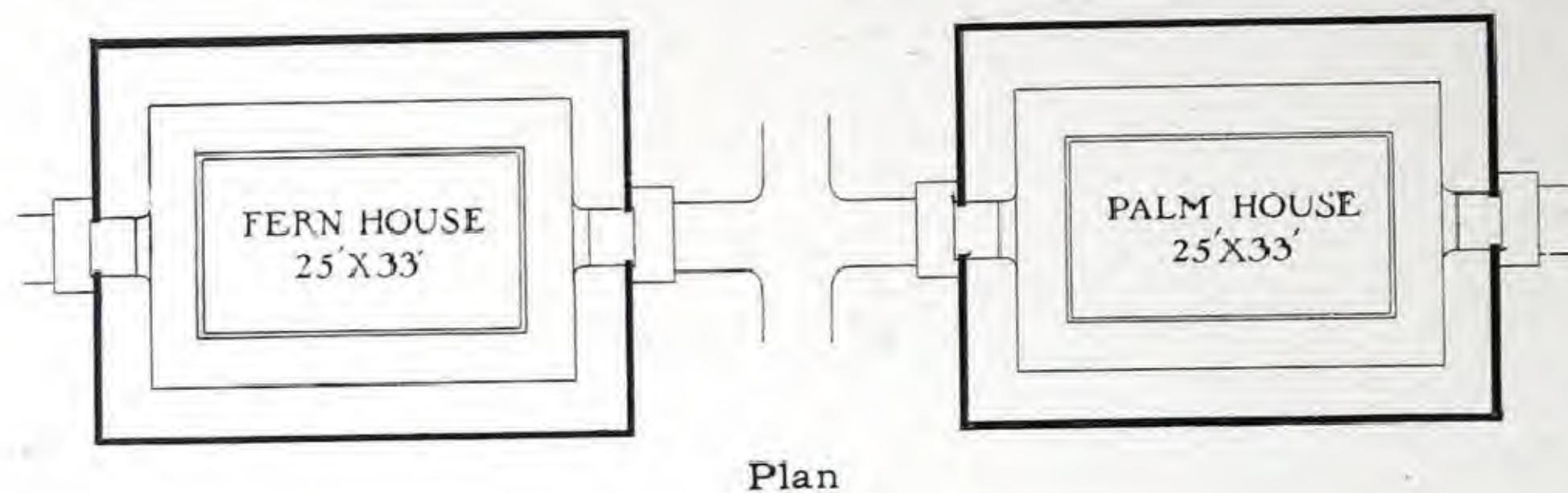


Views from the terrace, the lawn, and the garden.



Subject Eleven

Erected at Hyde Park, N. Y.

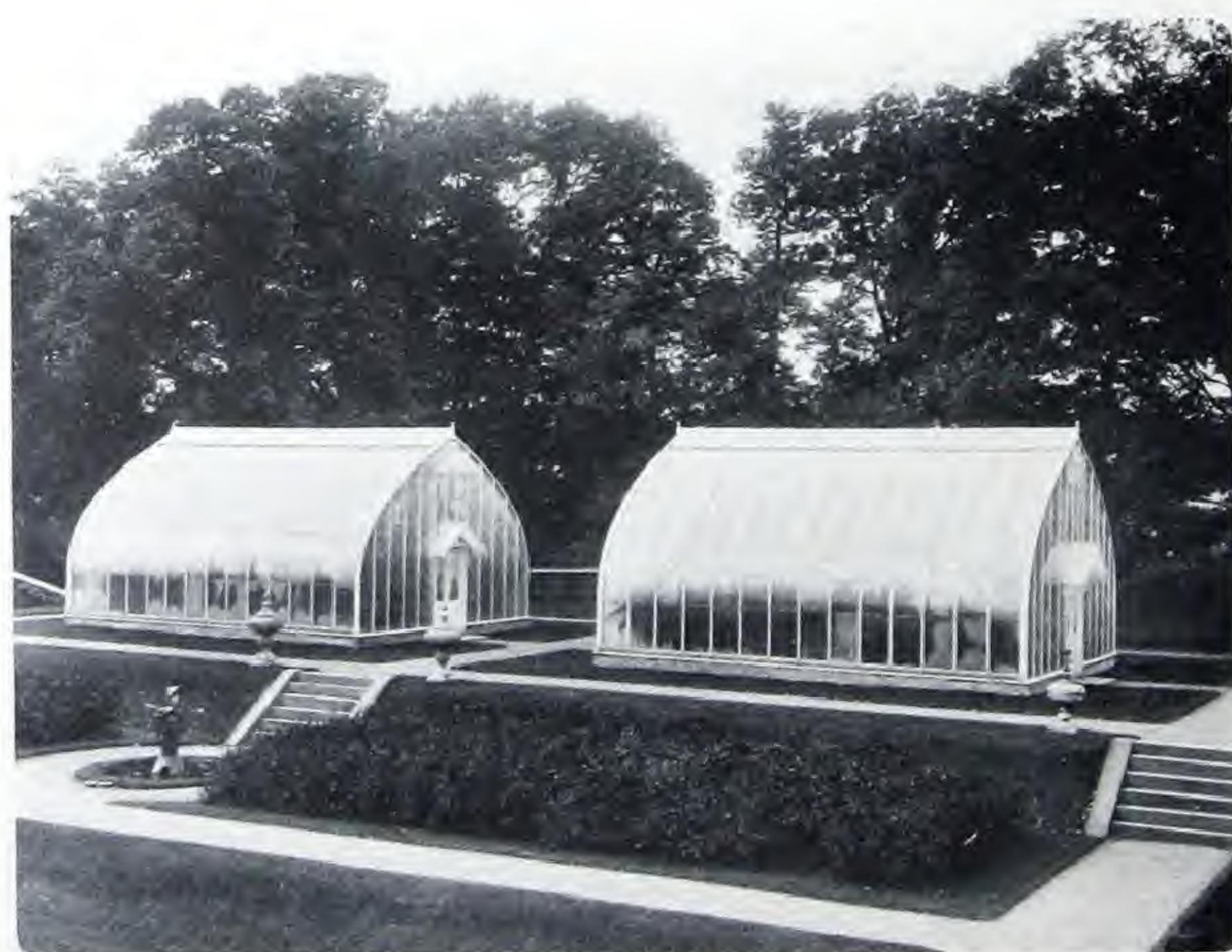


HERE is an architect's plan as carried out in connection with an elaborate formal garden scheme.

The twin arrangement was decided upon to preserve the center walk of the garden which leads to a beautiful river view.

The general growing houses are located at some distance on either side of these two houses from which heat is furnished.

Cross section "N" page 43 shows the mechanical construction of these houses.



The very simplicity of these houses, their charm.

Subject Eleven — *Continued*



The fern house.

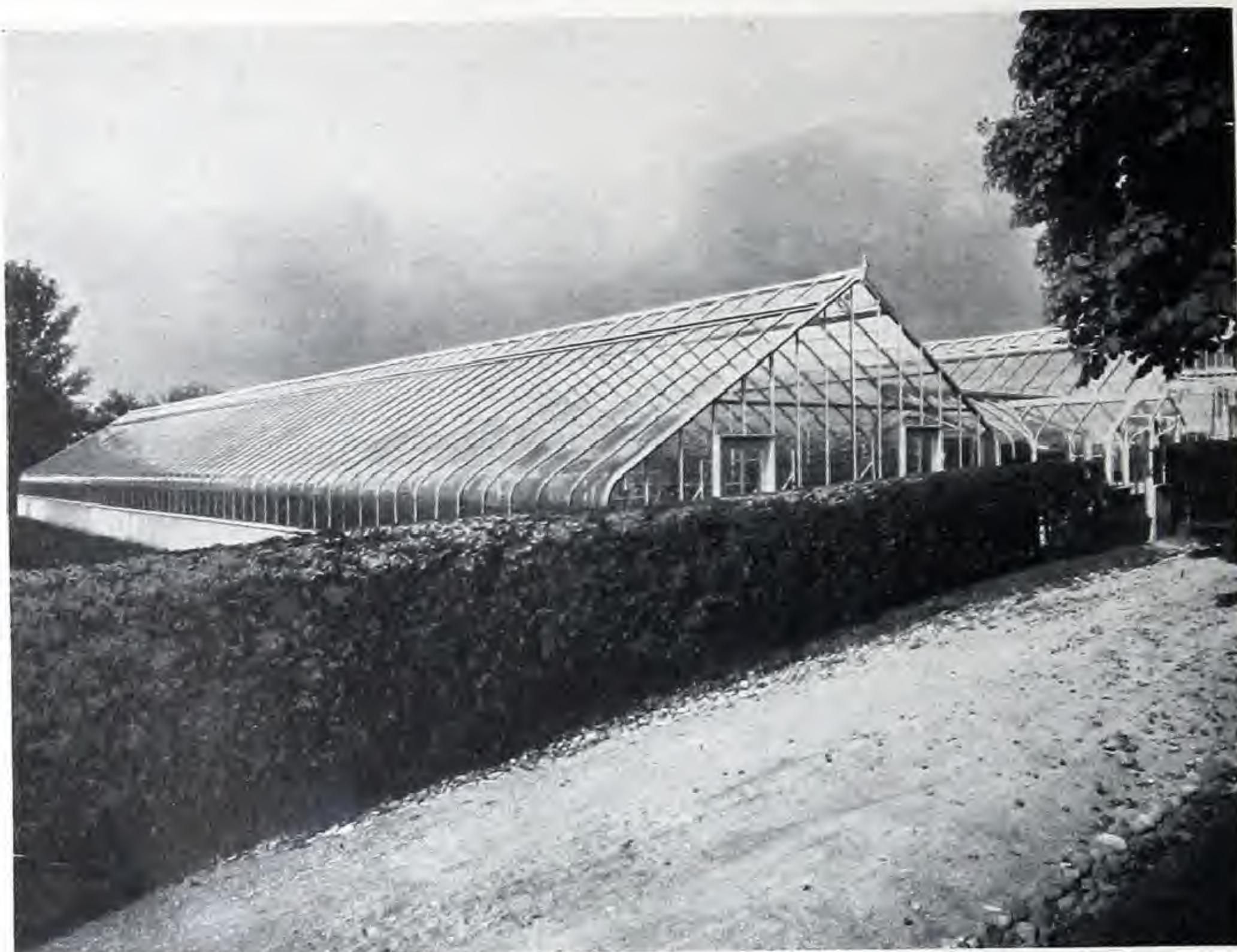


The palm house.



Subject Twelve

Erected at Madison, N. J.



These houses are 27 x 150 feet and are used for the growing of roses on a rather large scale.



Three weeks after planting.

[30]

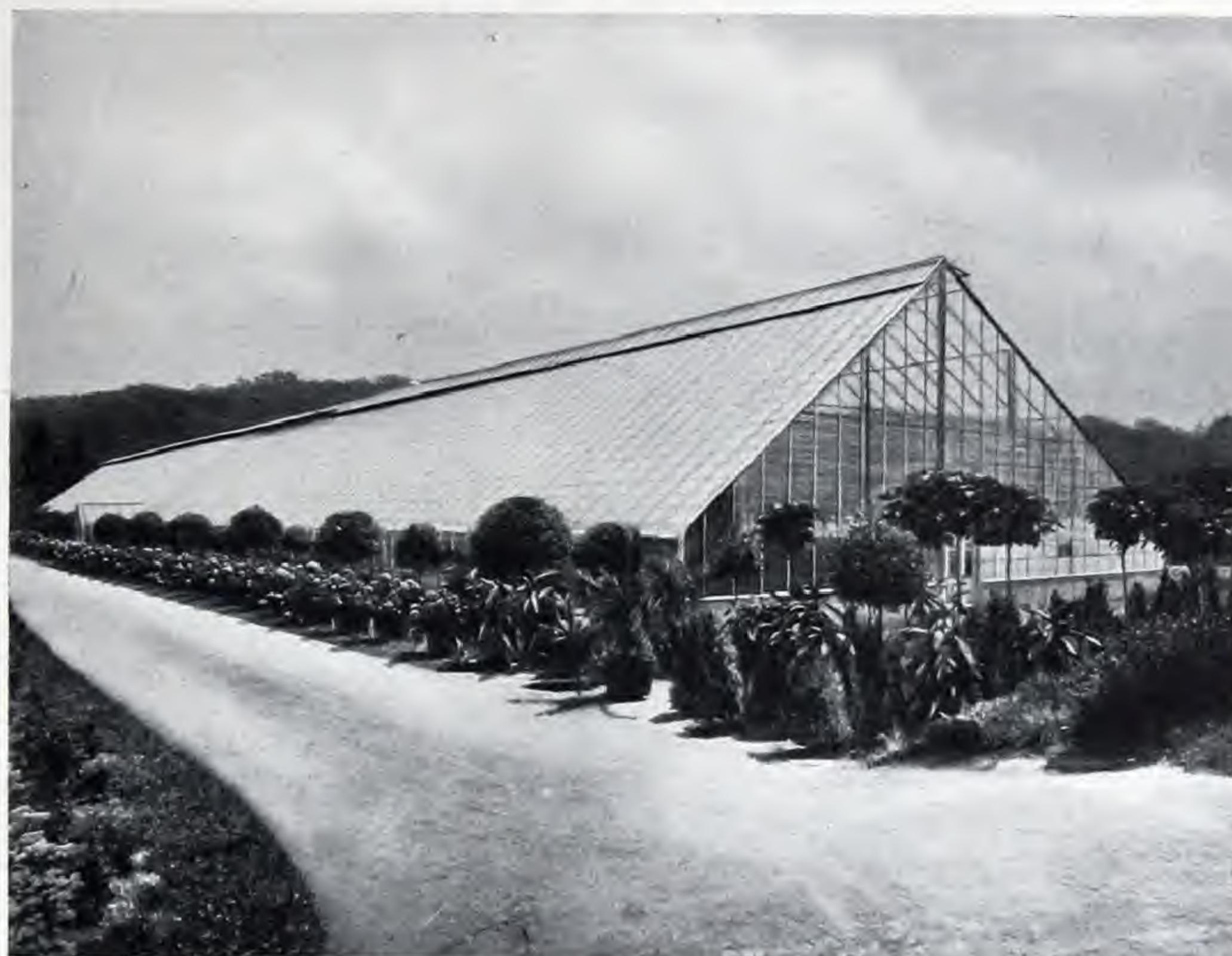


Pierson U-Bar Company



Subject Thirteen

Erected at Scarborough, N. Y.

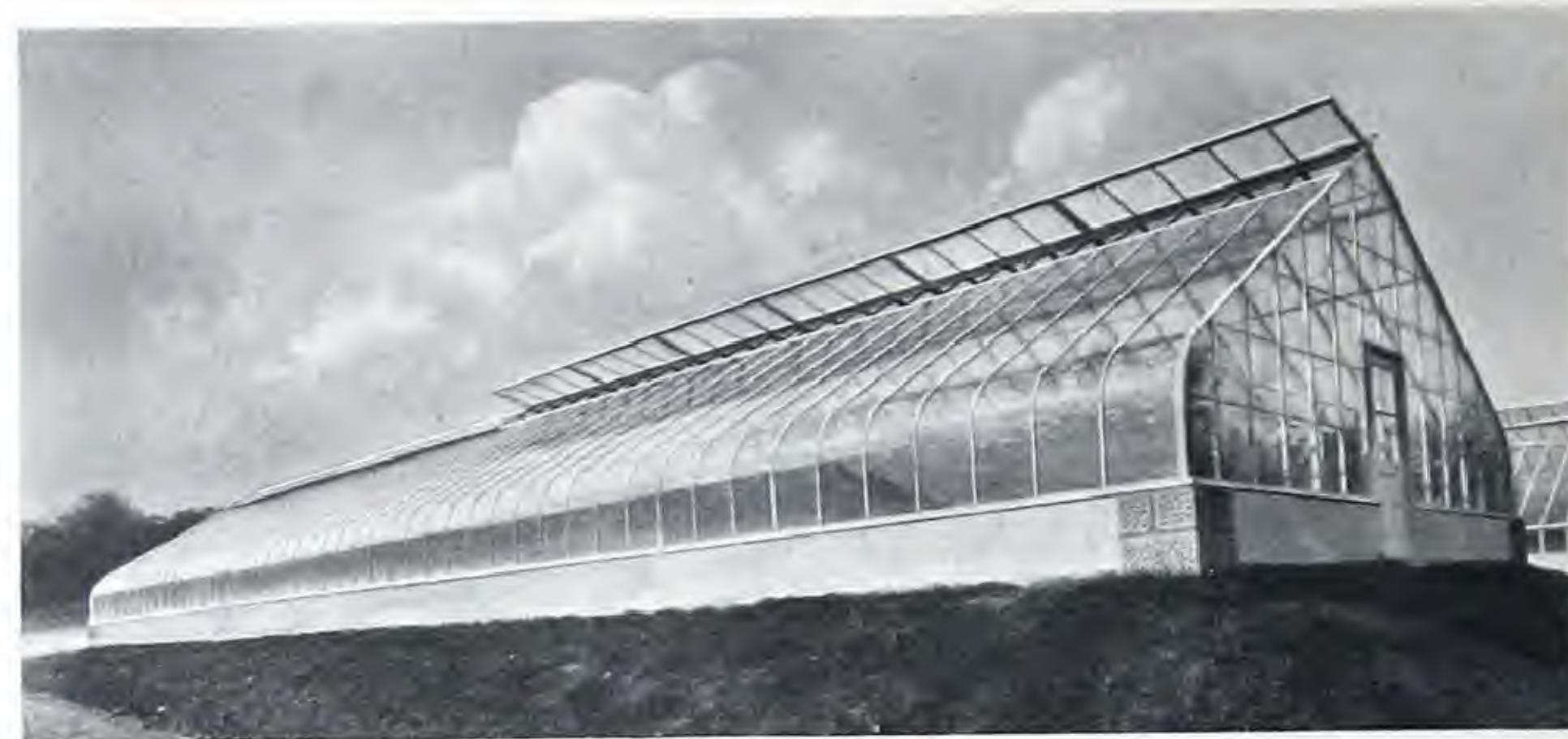


This house 56 x 300 feet was built for growing new and rare varieties of plants.



Filled with the famous Tarrytown fern.

The First U-Bar House Built



This photograph was taken about five years after erection. The house
being in perfect condition, no repairs having been made.



The interior planted with American Beauty roses. Note the extreme lightness
of construction and the vigorous plant growth.

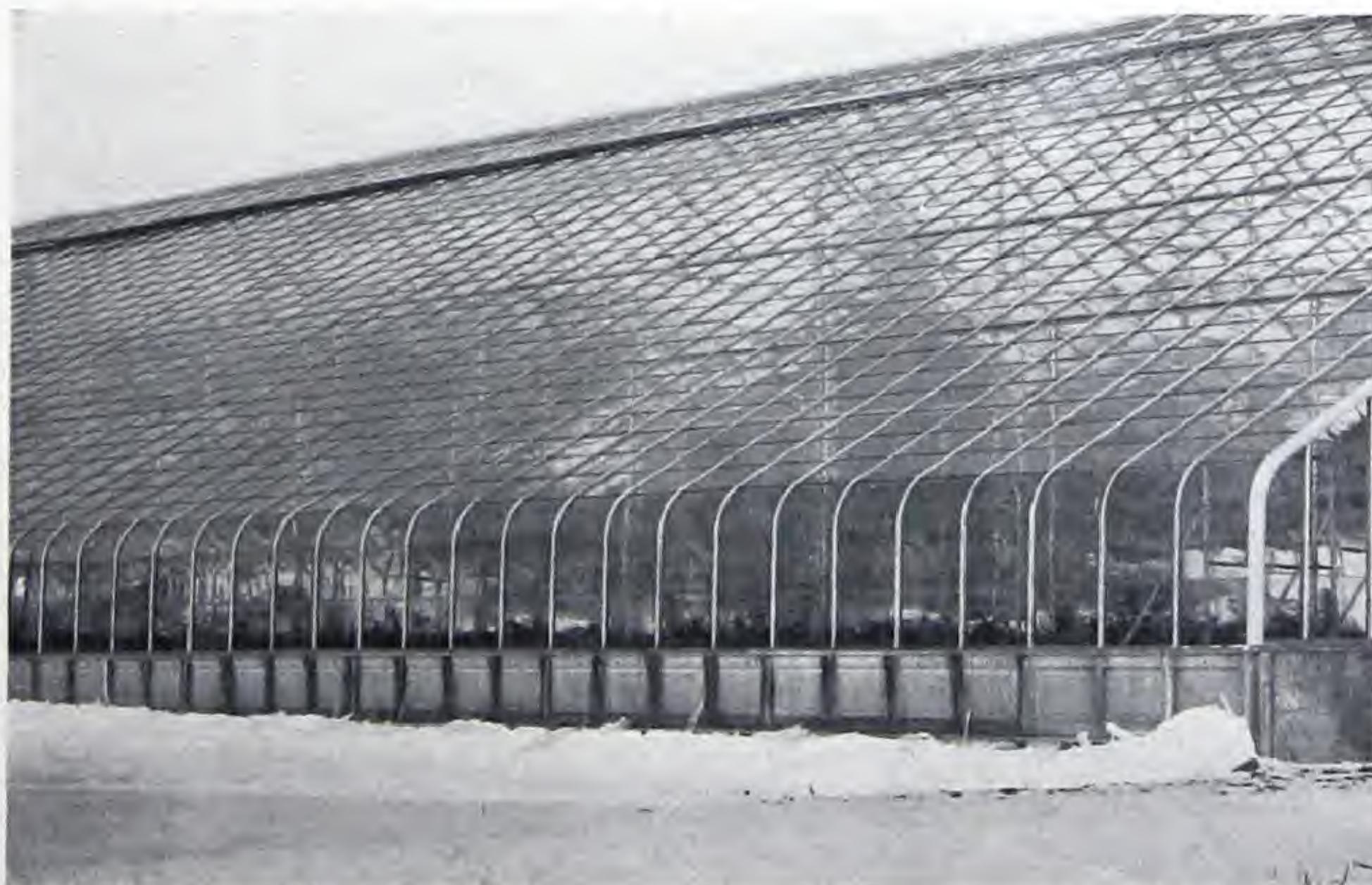


The Curved Eave, its Freedom from Ice



Both these houses face south. The exposure to the sun being identical. These photographs were taken at the same place at eleven o'clock on a January day. The upper illustration shows a regular iron frame type of house with icicles and snow clinging to the south side eaves, this being the usual condition in cold weather with this type of house.

The lower illustration shows the U-Bar house with its entire freedom from snow and ice under the same conditions. The curved eaves and the absence of gutters or plates at the eaves prevent the accumulation of snow and ice.





The U-Bar Described

Sizes

THESE pictorial cuts of the U-Bar show exact sizes; the smaller bar being used for general work, the larger bars for palm houses and other structures requiring additional strength.

Encasing of Core

The U-shaped steel bar encases the lower portion of the cypress core bar, the latter being secured to the U-Bar with screws placed alternately on either side about four feet apart, thus binding core and bar together at every two feet.

The Glass, Glazing Method

The glass is laid with lapped joints of about $\frac{1}{4}$ " and bedded in putty directly upon the edges of the U-Bar, and secured to the projecting portion of the core bar with wedge shaped zinc glazing nails.

Expansion and Contraction

The object of extending the core bar is to guard against exposing any metal surfaces to the uneven outside temperatures, so preventing destructive expansion and contraction, and consequent loosening of the putty bed and breakage of glass. It also provides the best known medium for adhesion of the putty and the fastening of the glass.

Core Bar Treatment against Decay

Before insertion in the steel bar, the core bar is chemically treated to prevent its decay. After insertion it is painted a coat of white lead and oil. Then the putty bed is placed, the glass set, followed by the exposed portion of the core bar being given a second coat of white lead and oil completing this thorough outside protection.

Steel Casing Protection

The steel casing protects the core bar from the destructive conditions existing in the interior of greenhouses, and eliminates all interior woodwork, while the open space below the core, insures a circulation of air as an additional protection against decay.

Rust Prevention

To prevent all possibility of rusting, the steel portion of the bar is heavily galvanized, by the hot process, after all bending, drilling and fitting is done.

Aluminum Interior Finish

After the squeezed out putty is cut off from the inside and its exposed edges painted, the bar is coated with aluminum making a wonderfully bright, attractive, and durable finish to which neither dirt or mildew adheres, or moisture effects, thus eliminating the expense of frequent interior painting.

Drip Groove and Condensation

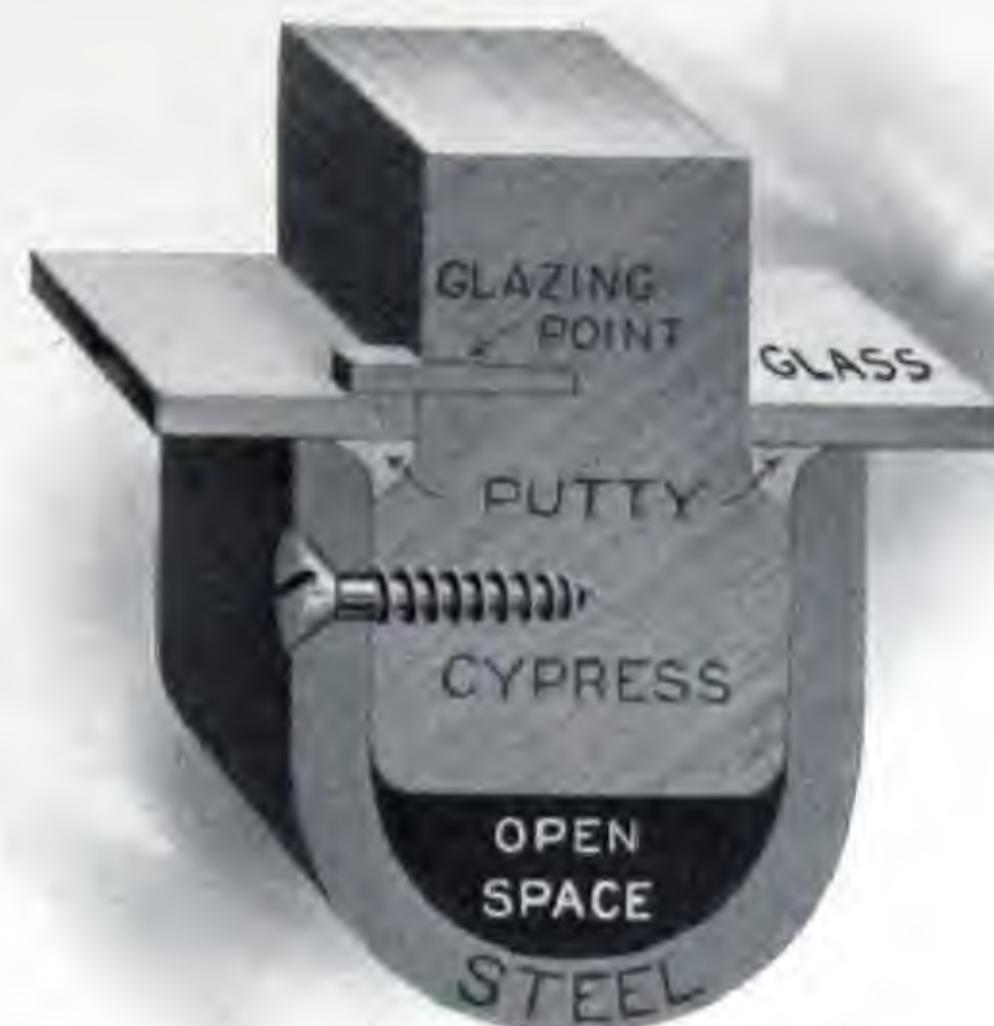
Drip grooves are not necessary to carry away condensation because in all weather what little condensation forms upon the exposed surface of the bar follows down until intercepted by the lateral supporting members which also act as conductors to carry away this condensation. There is enough warmth transmitted through the bar to the glass to always keep in any weather a strip of glass next the bar about $\frac{1}{4}$ " wide perfectly clean and dry, thereby doing away with any moisture or water ever reaching the bar from the glass surface, resulting in the driest roof ever used for greenhouse purposes.

Its Application

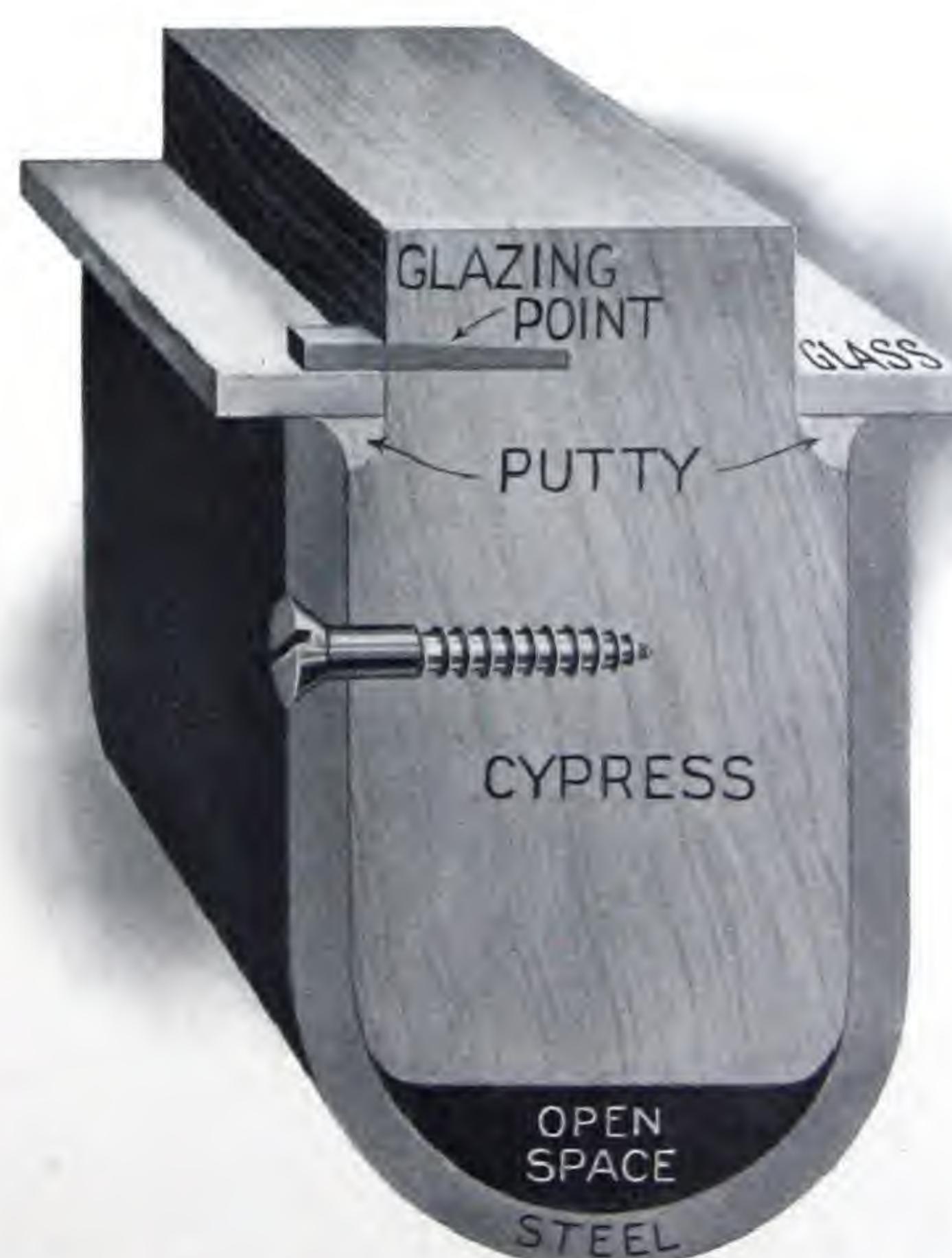
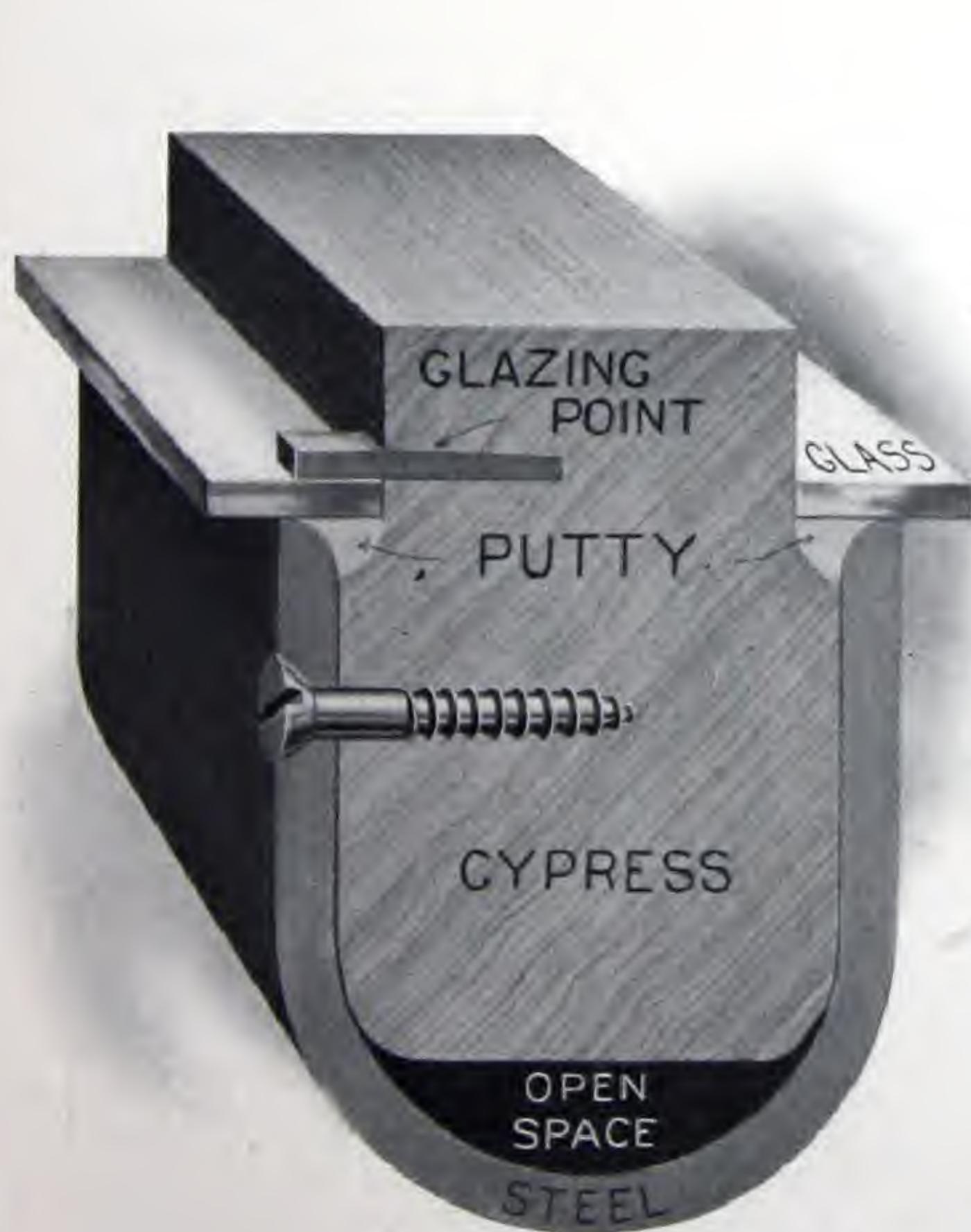
The cross sections and side wall constructions on the following pages will show the simple and practical application of the U-Bar to the many varying types of greenhouses.



The U-Bars



This shows exact size of the U-Bar used in general work.



These are exact sized bars used in large palm houses and other large structures.



1



2



3



4

Some Examples of Structural Details

1. Gable with hooded entrance.
2. Lean-to house with valley roof connection.
3. One type of vestibule.
4. Interior connection between a small and larger house.
5. The curved eaves with its simplicity and symmetry of form. Note the location of the side ventilators opening under the benches.
6. Exterior connection between a small and larger house.



5

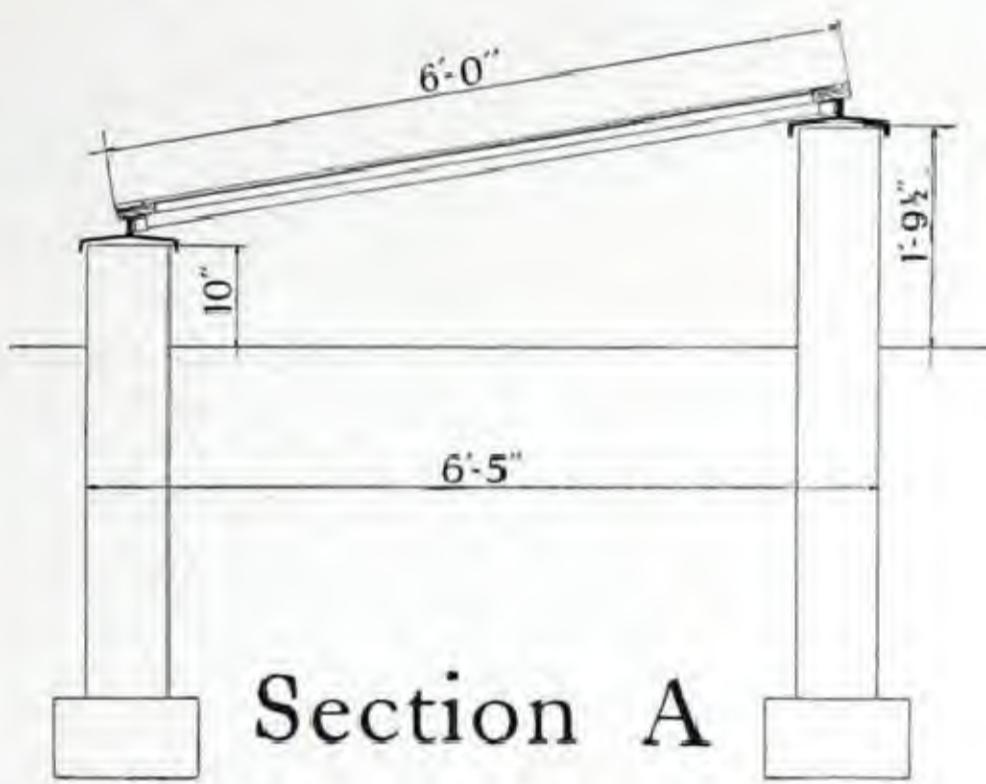


[36]

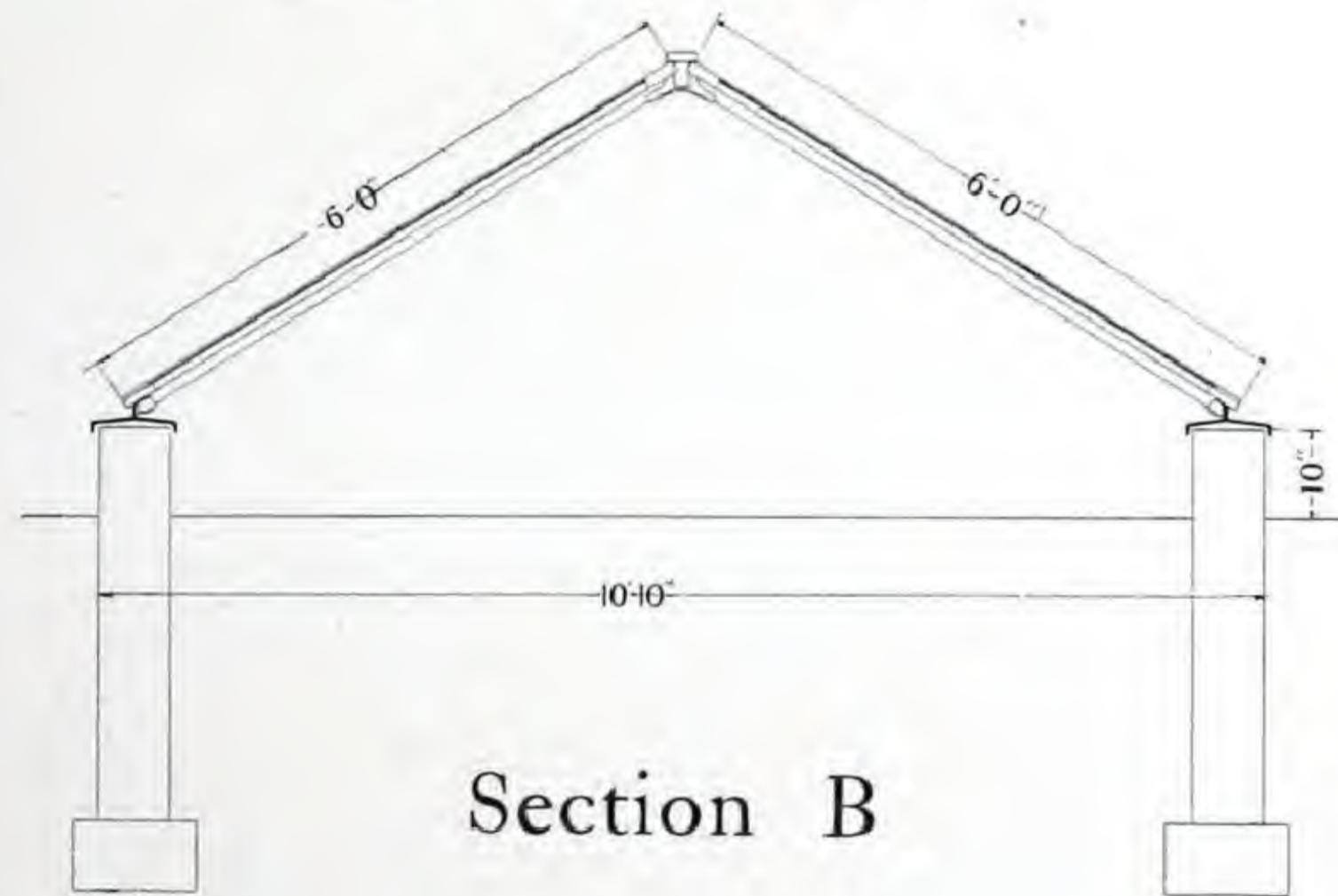


Standard Sections and Side Wall Constructions

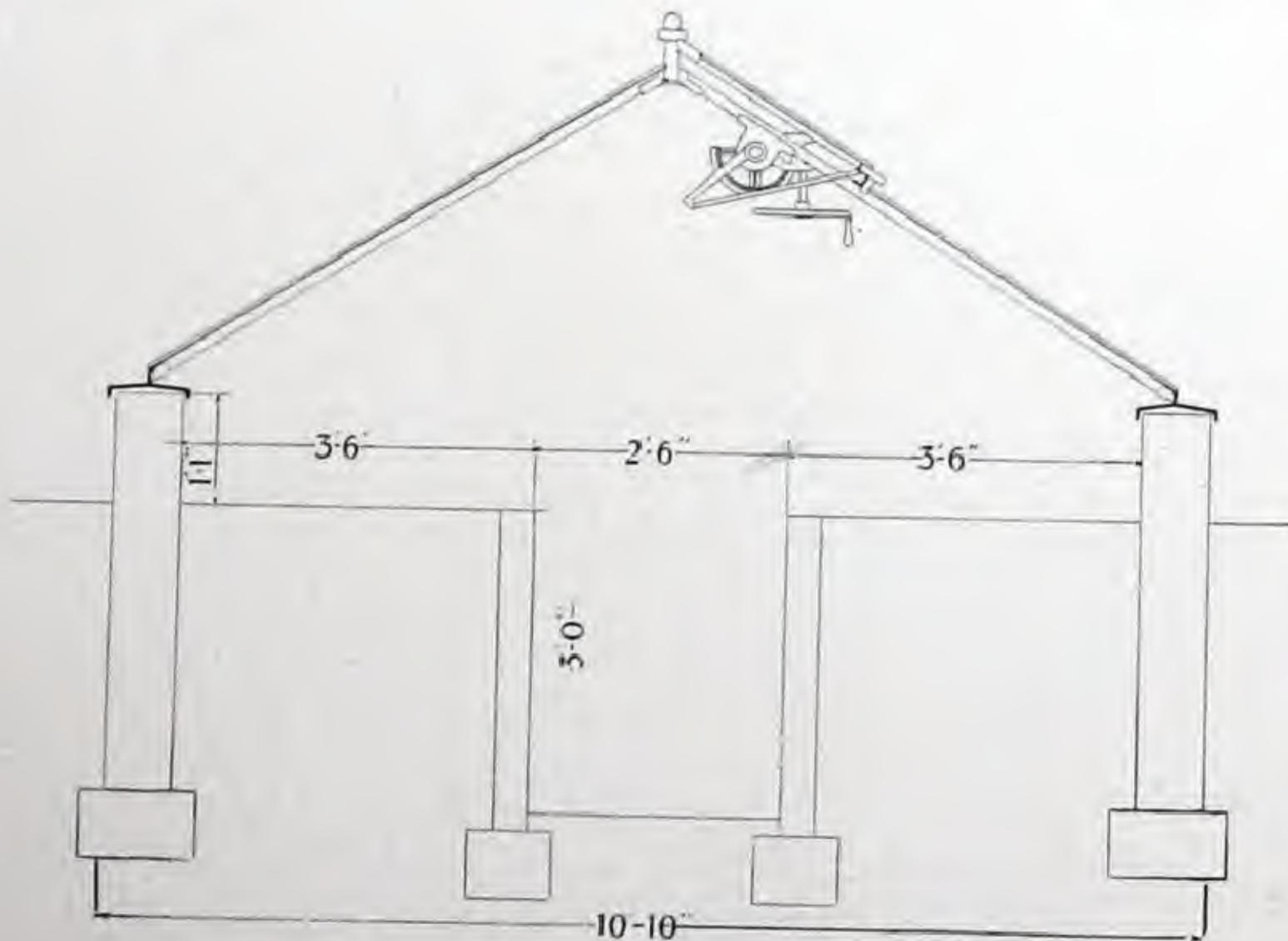
HERE are a series of standard sections and side wall constructions covering the usual requirements and what experience has proved to be the most economical and efficient. These will be found to meet the demands of most greenhouses schemes ; with variations they will cover all special cases.



Section A



Section B



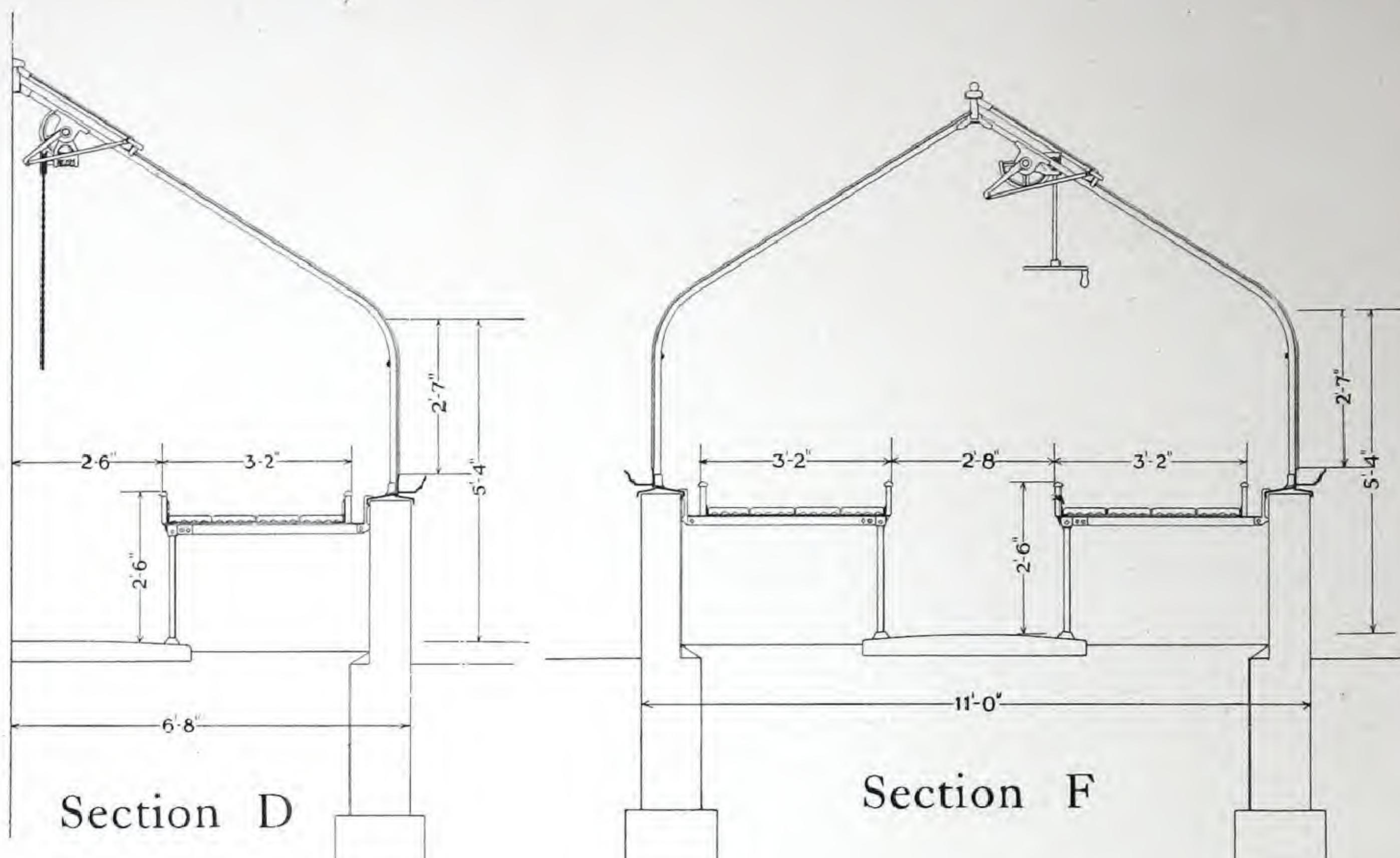
Section C

DESCRIPTION

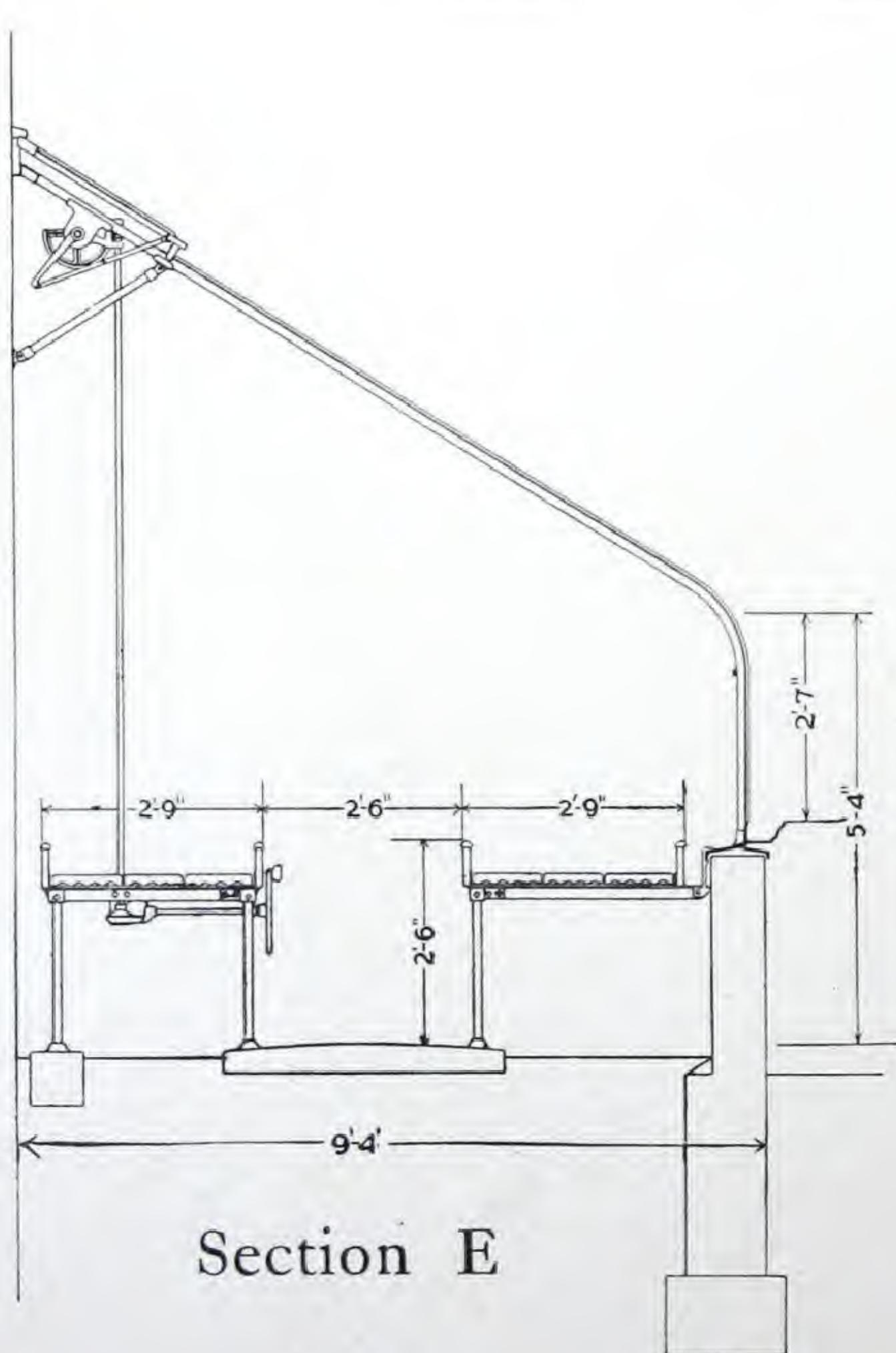
A—Sash frame with removable 3 by 6 feet sash. Cast iron sills are used to cap the walls. U-Bar rafters are bolted to the sills. Can be used for cold frame, hot bed or heated frame, and by increasing the depth, can be made a storage pit. Shown in actual use on pages 6 and 7.

B—Double side sash frame, intended for the same purposes as "A" but on a larger scale.

C—Pit house with stationary roof, one line of ventilators, two solid beds and center walk. Especially adapted for growing violets, lettuce and numerous varieties thriving in a cool temperature and close glass contact. Equally valuable for a storage pit for wintering hydrangeas, roses, azaleas, and other semi-hardy plants.



DESCRIPTION



D—Single bed lean-to with ridge ventilation; for use on side of building or wall. The simplest and cheapest form of house.

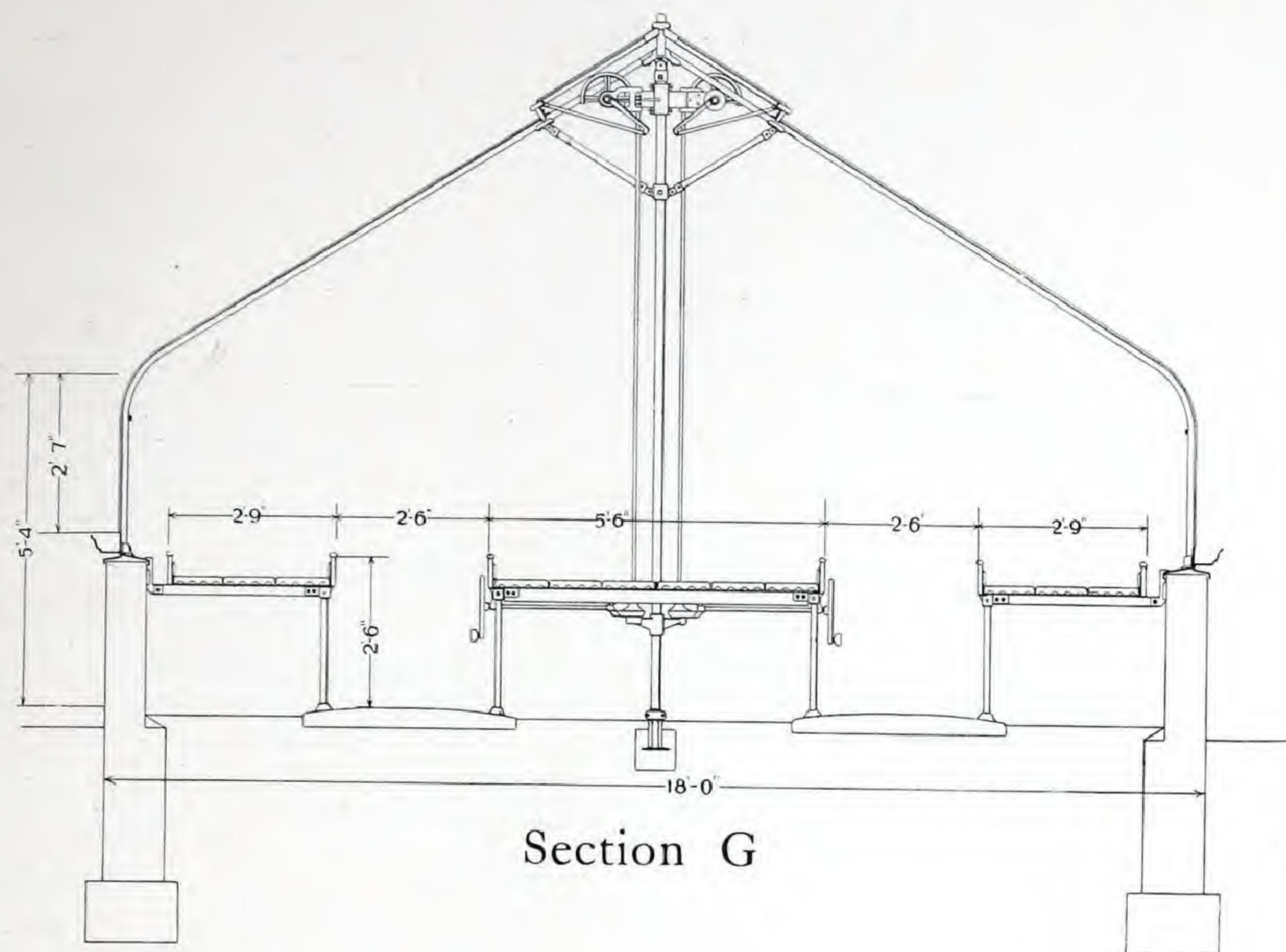
E—Two bed lean-to with center walk. See upper illustration page 25.

F—Simplest form of even span house with side beds and center walk, and one line of ventilation. See upper illustration page 20.

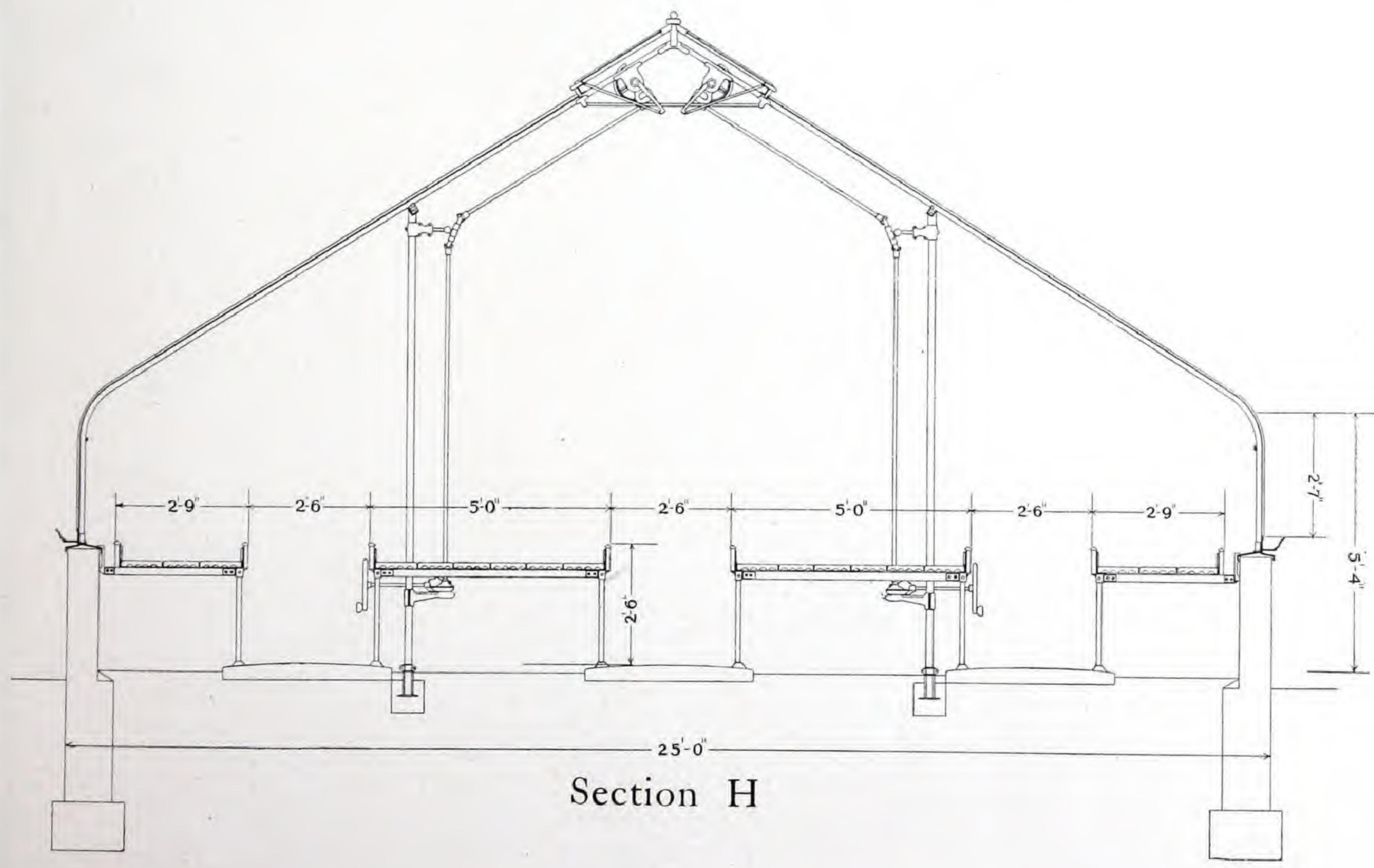
G—Even span house with two side and one center bed, two walks, and two lines of ventilation. See lower illustrations pages 15 and 24.

H—Even span house with two side and two center beds, three walks and two lines of ventilation. See lower illustration page 13.

NOTE—For details of side wall construction see page 46. Alternate side wall construction shown on pages 47 to 53.

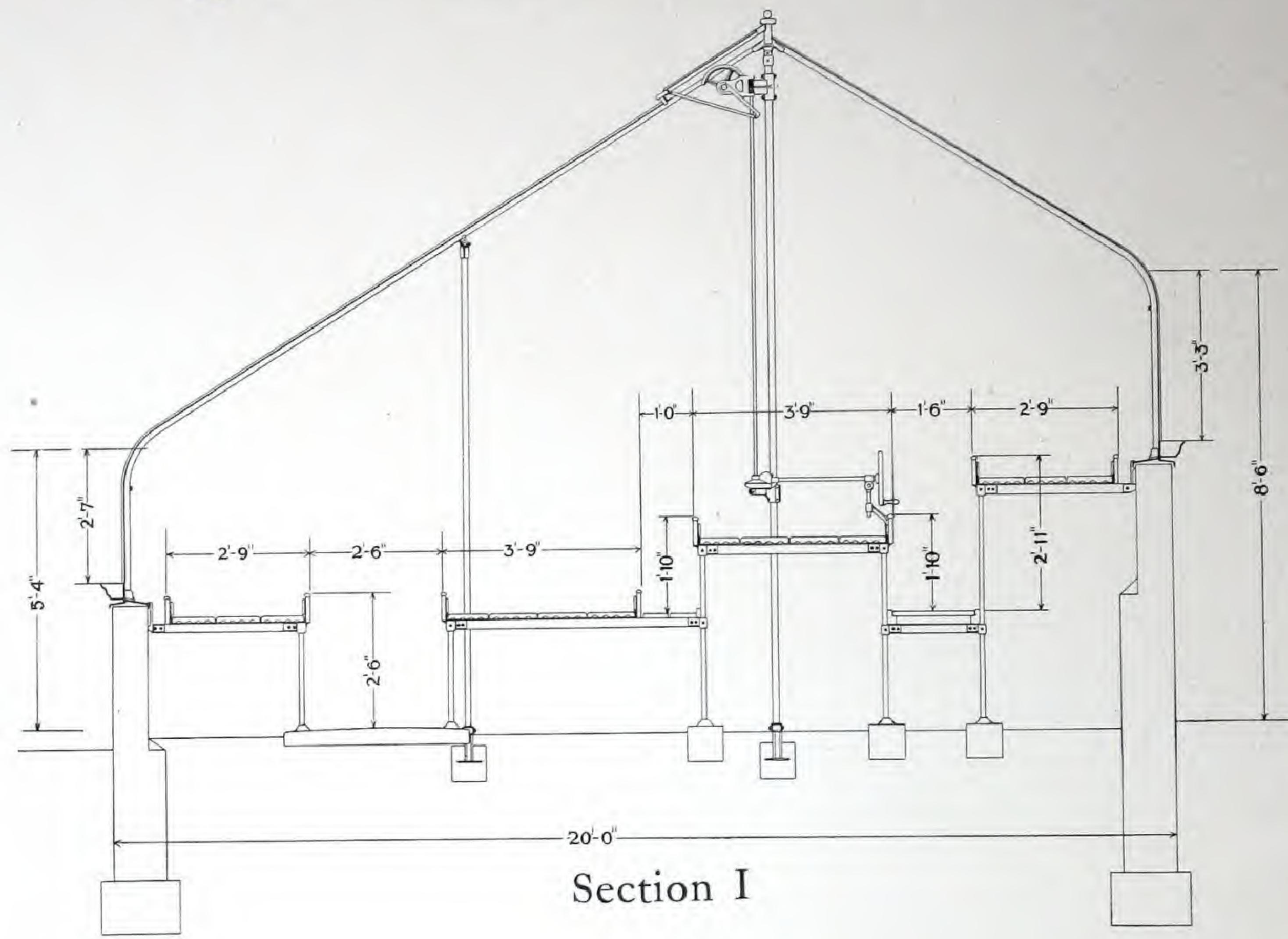


Section G

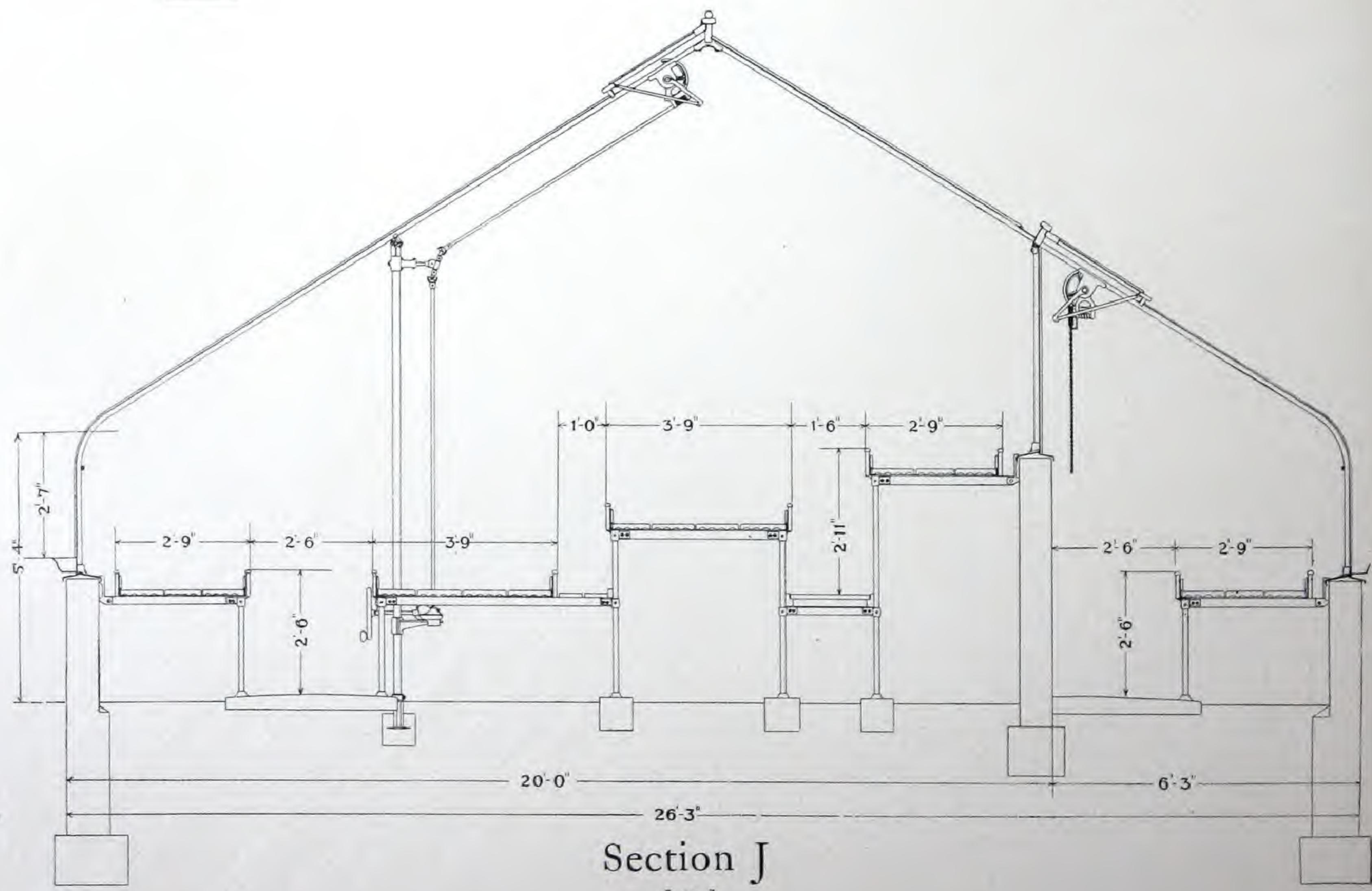


Section H

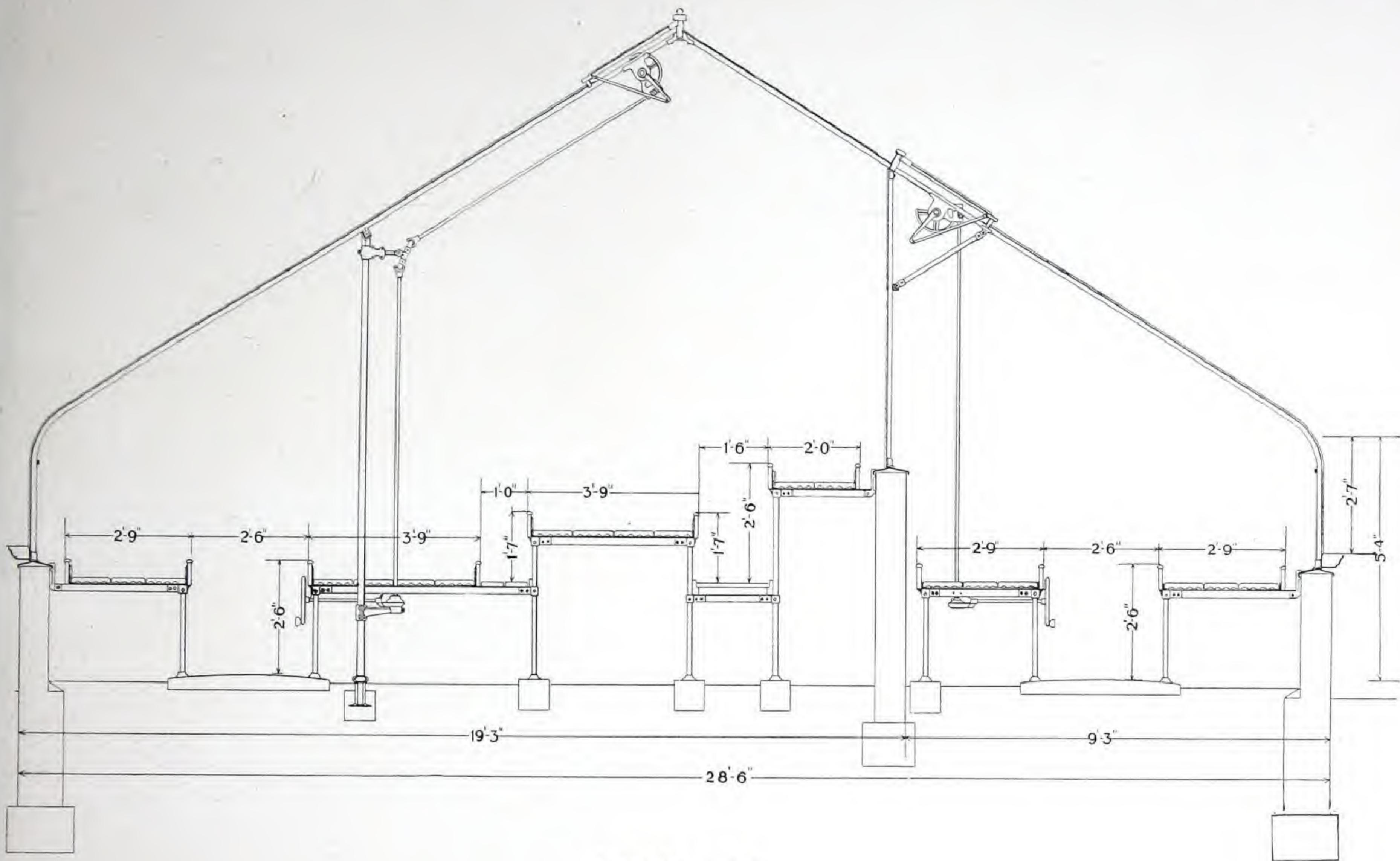
U-Bar Greenhouses



Section I



Section J



Section K

DESCRIPTION

I—Three-quarter span greenhouse designed to face south, fitted with one line of ridge ventilators; the plant beds on either side of front walk placed the usual height, the others stepped up. Particularly adapted for rose growing. See illustrations on page 7.

J—Same as section "I" with single bed lean-to at rear forming an even span house. See upper illustration page 21 and example 2 page 36.

K—Same as "I" with double bed lean-to at rear. See upper illustrations pages 21 and 25.

NOTE—For details of side wall construction see page 46. Alternate side wall constructions shown on pages 47 to 53.

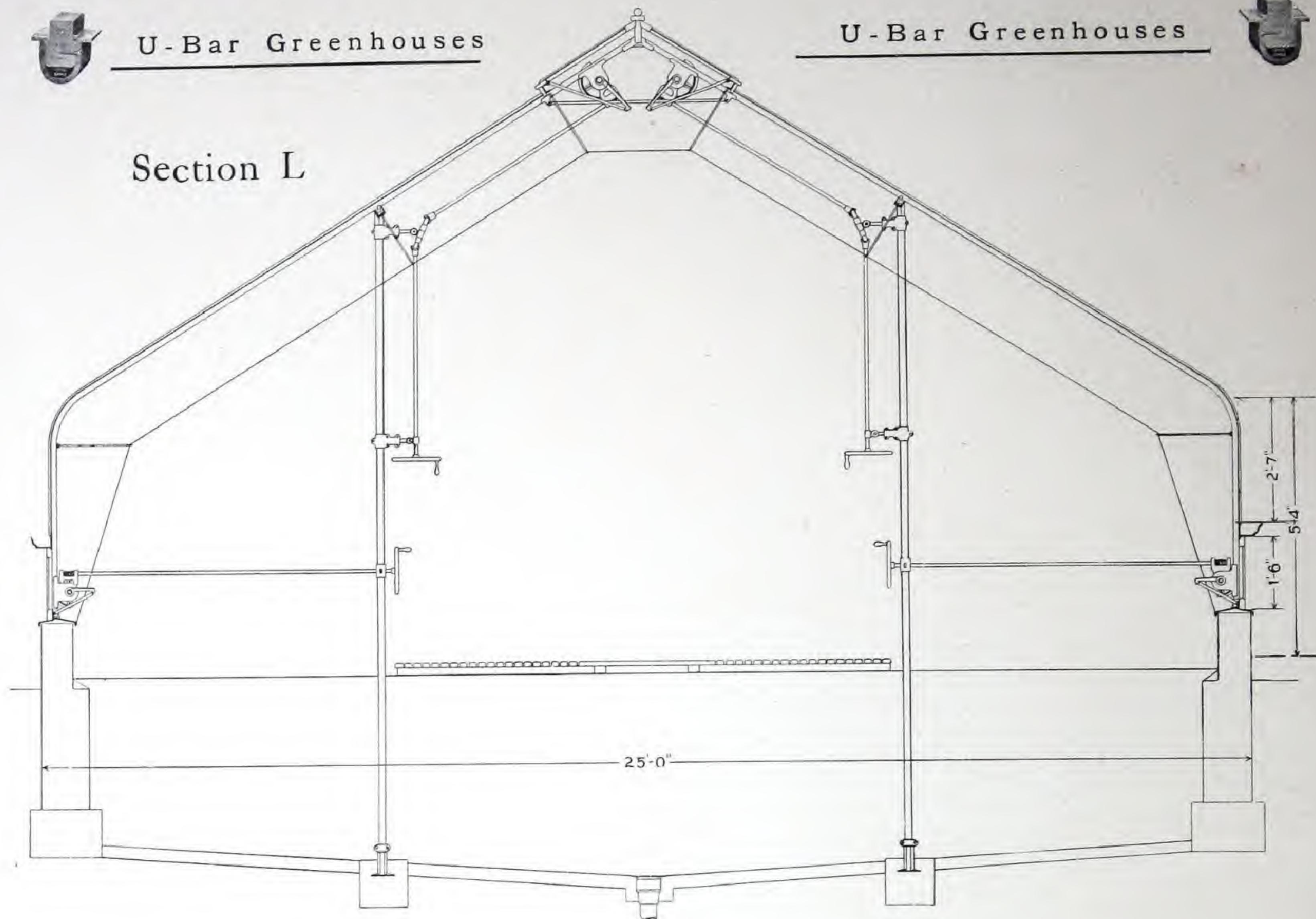


U-Bar Greenhouses

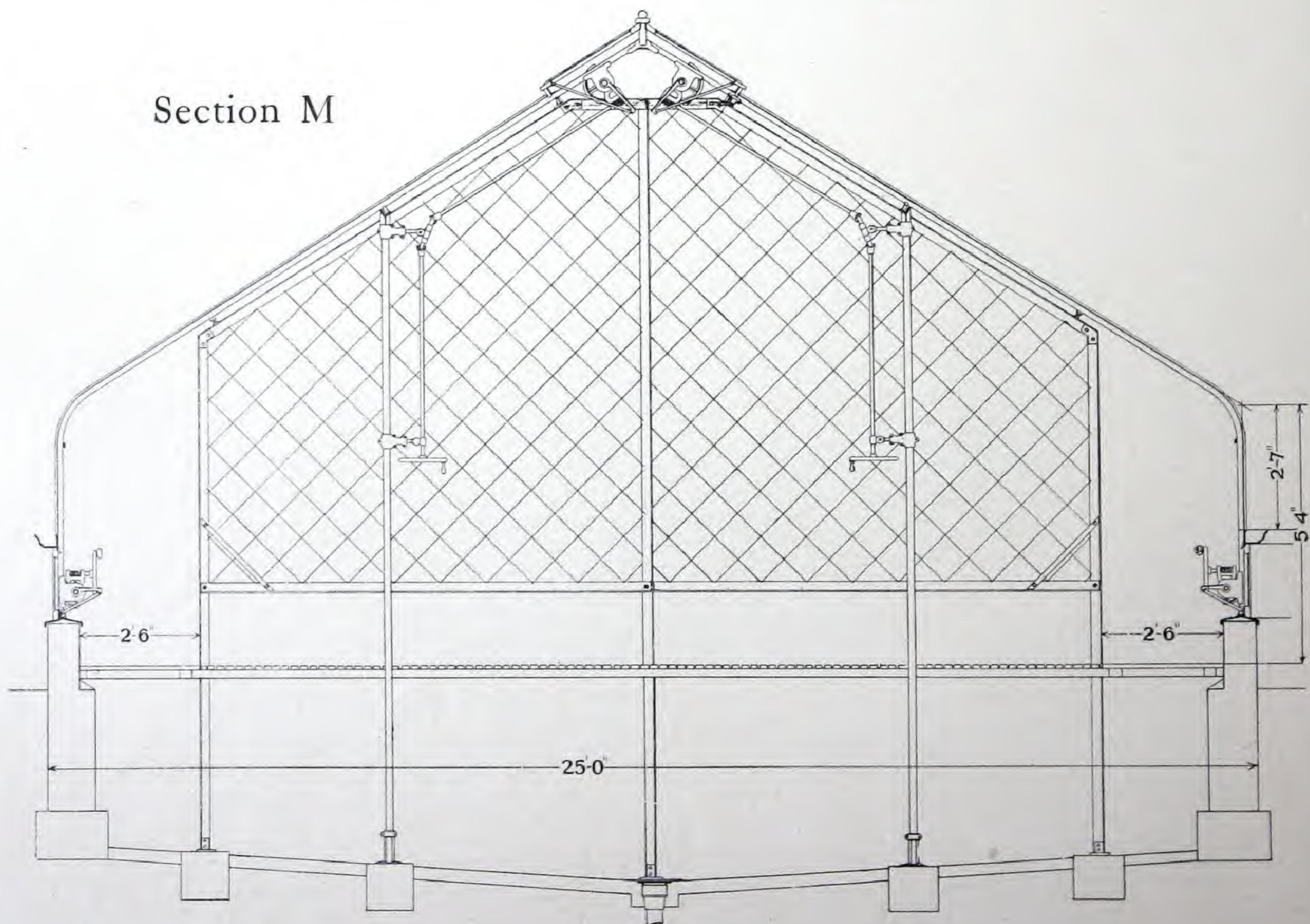


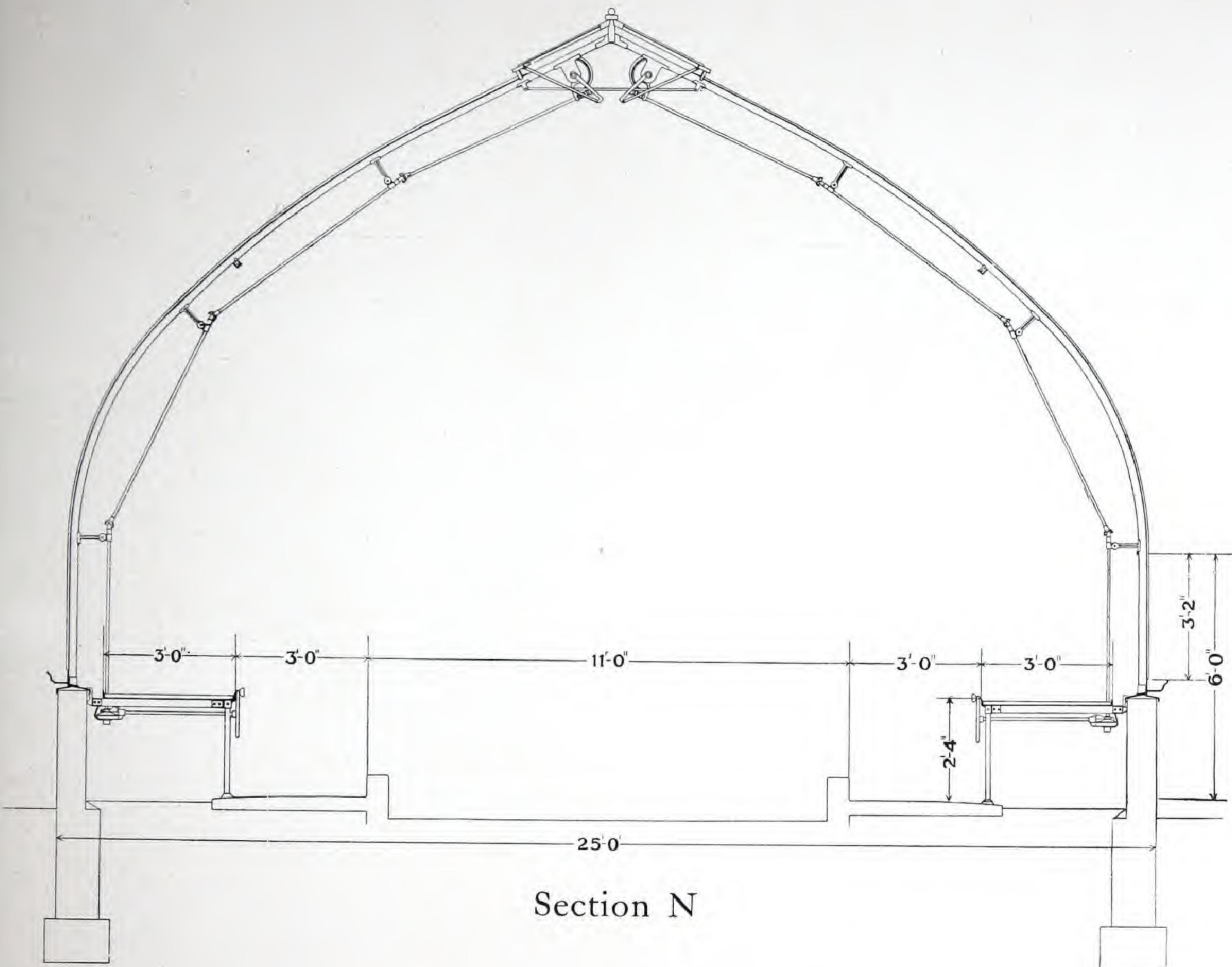
U-Bar Greenhouses

Section L



Section M





Section N

DESCRIPTION

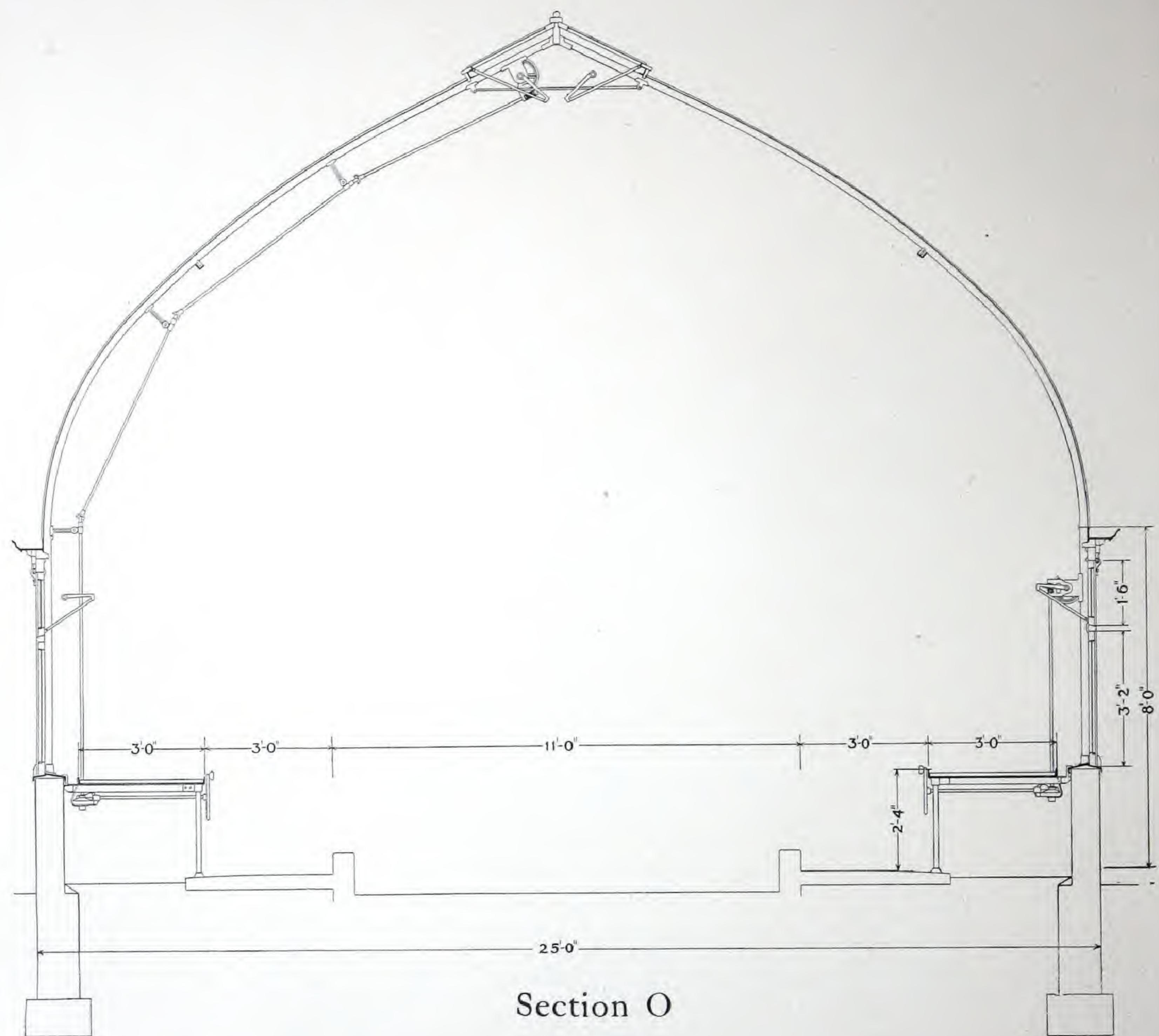
L—Vinery with side and roof ventilators, wire trellis for vines, cement bottom to confine roots, ample space for drainage and soil, slat walk through center. See illustrations page 11. For a three-quarter span viney see lower illustration page 25.

M—Peach or nectarine house with side and roof ventilators, cross wired trellis for supporting trees, cement bottom, and slat walks. See illustration page 22.

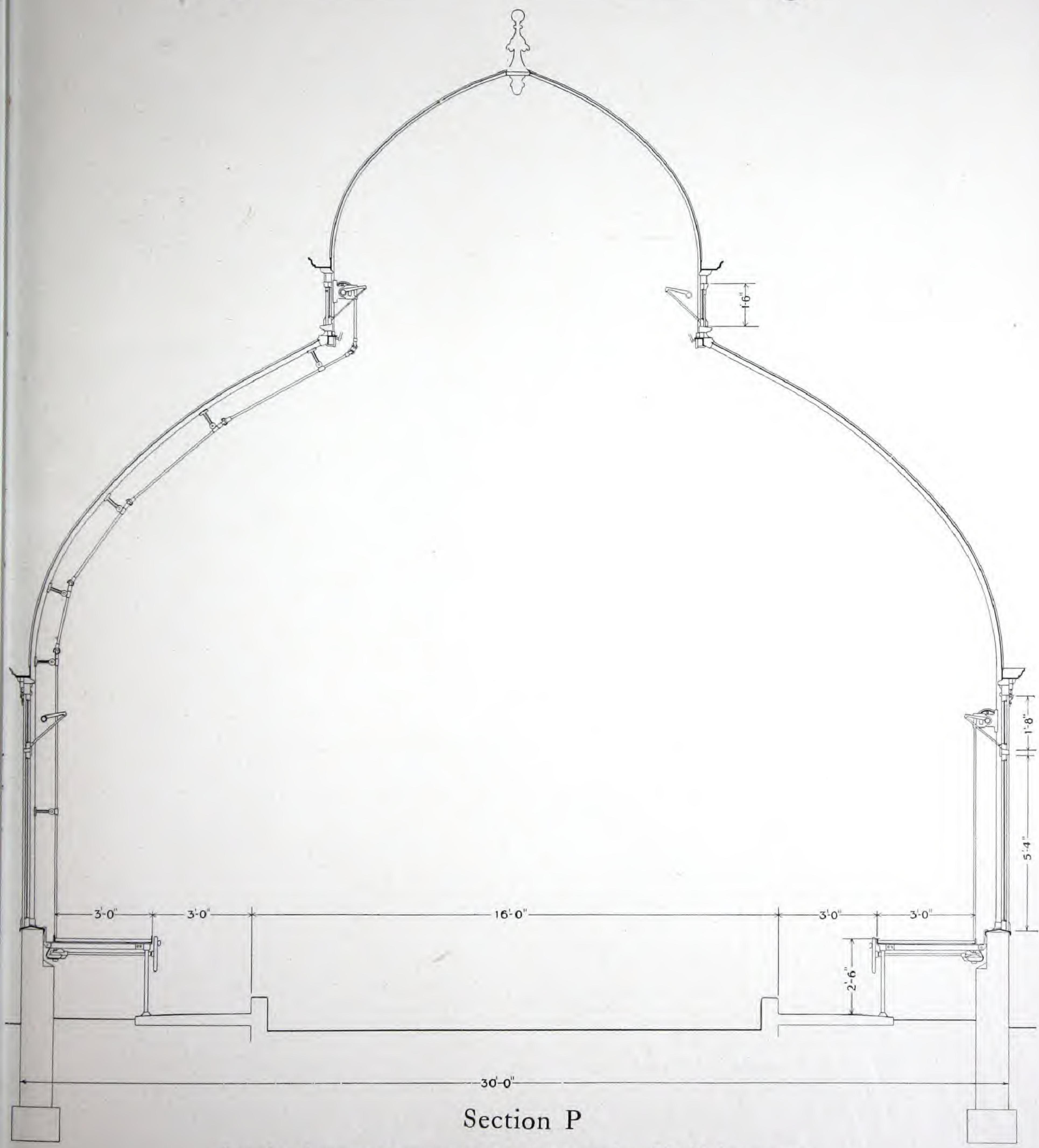
NOTE.—For details of side wall construction see page 50. For alternate side wall construction see page 53.

N—Simplest form of curved roof conservatory for palms and ornamental plants, fitted with two lines of roof ventilators, no side sash. Two side tables, walks and center bed. See illustrations pages 28 and 29.

For details of side wall construction, see page 46. For alternate side wall construction, see pages 47, 48, 49, 51 and 52.

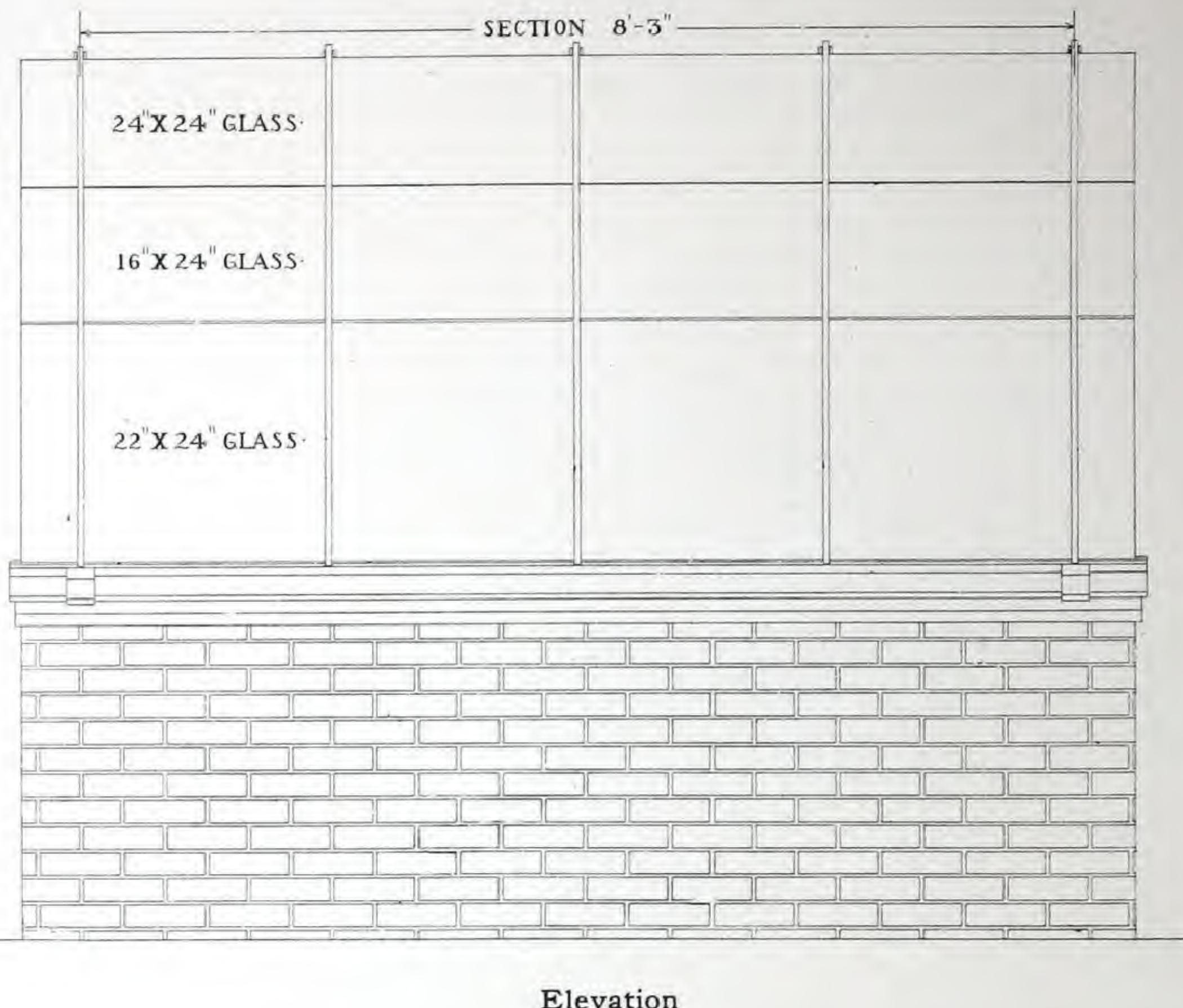
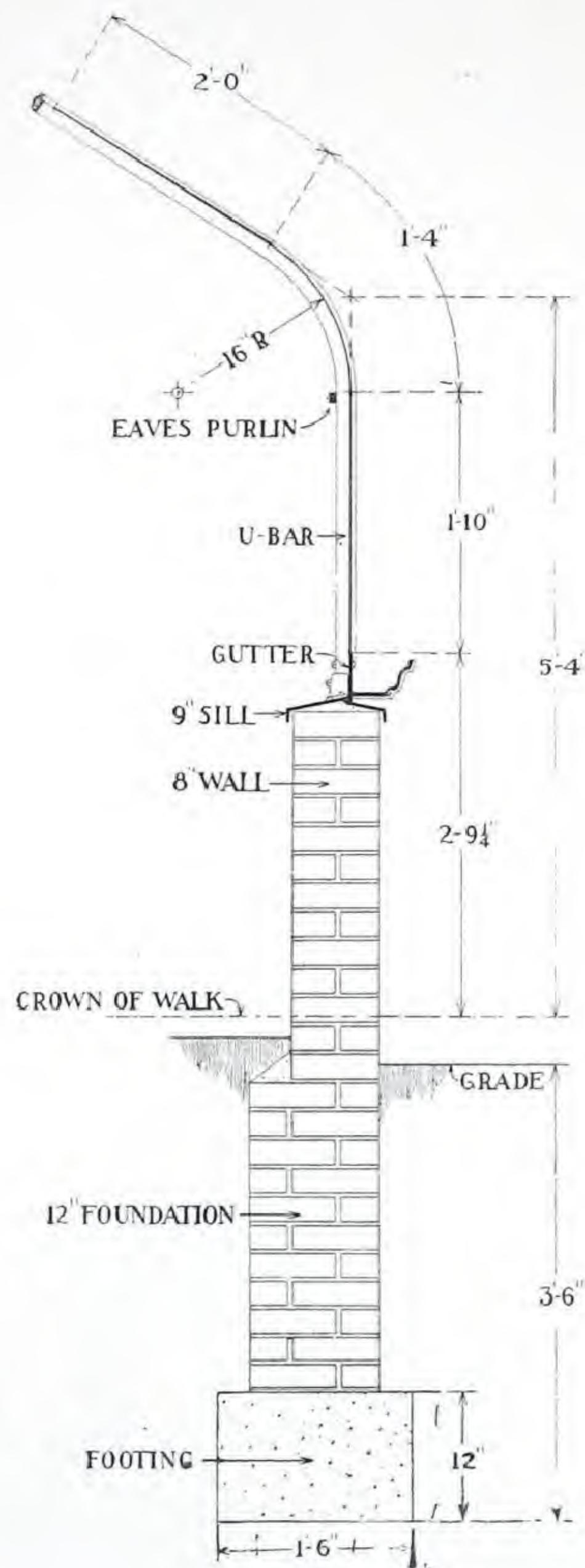


Curved roof conservatory with high glass sides and transom ventilators; two lines of roof ventilators, usual table, walk and bed arrangement; for palms, ornamental plants, etc.



Section P

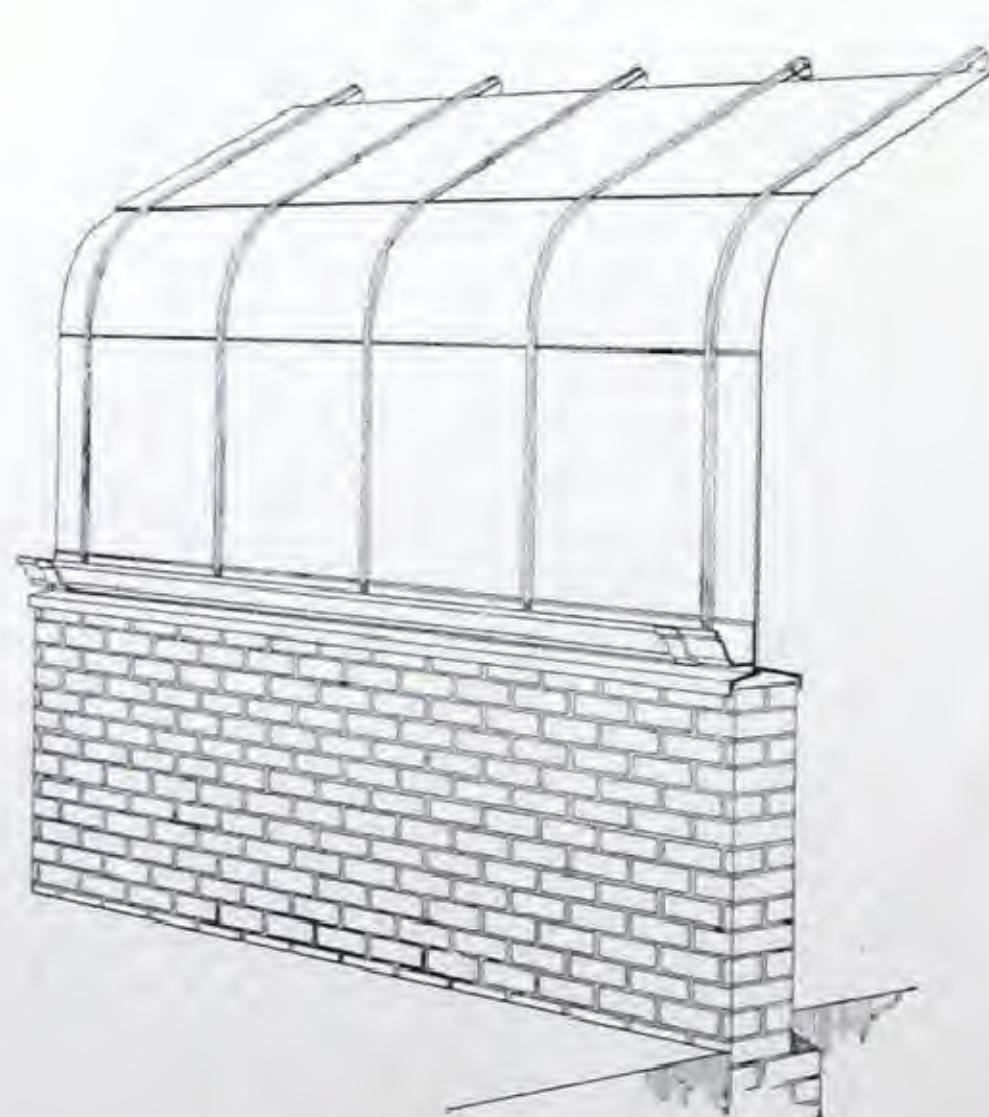
Curved roof conservatory same construction as section "O" with lantern top.
See pages 17 and 19 and lower illustration on page 21.



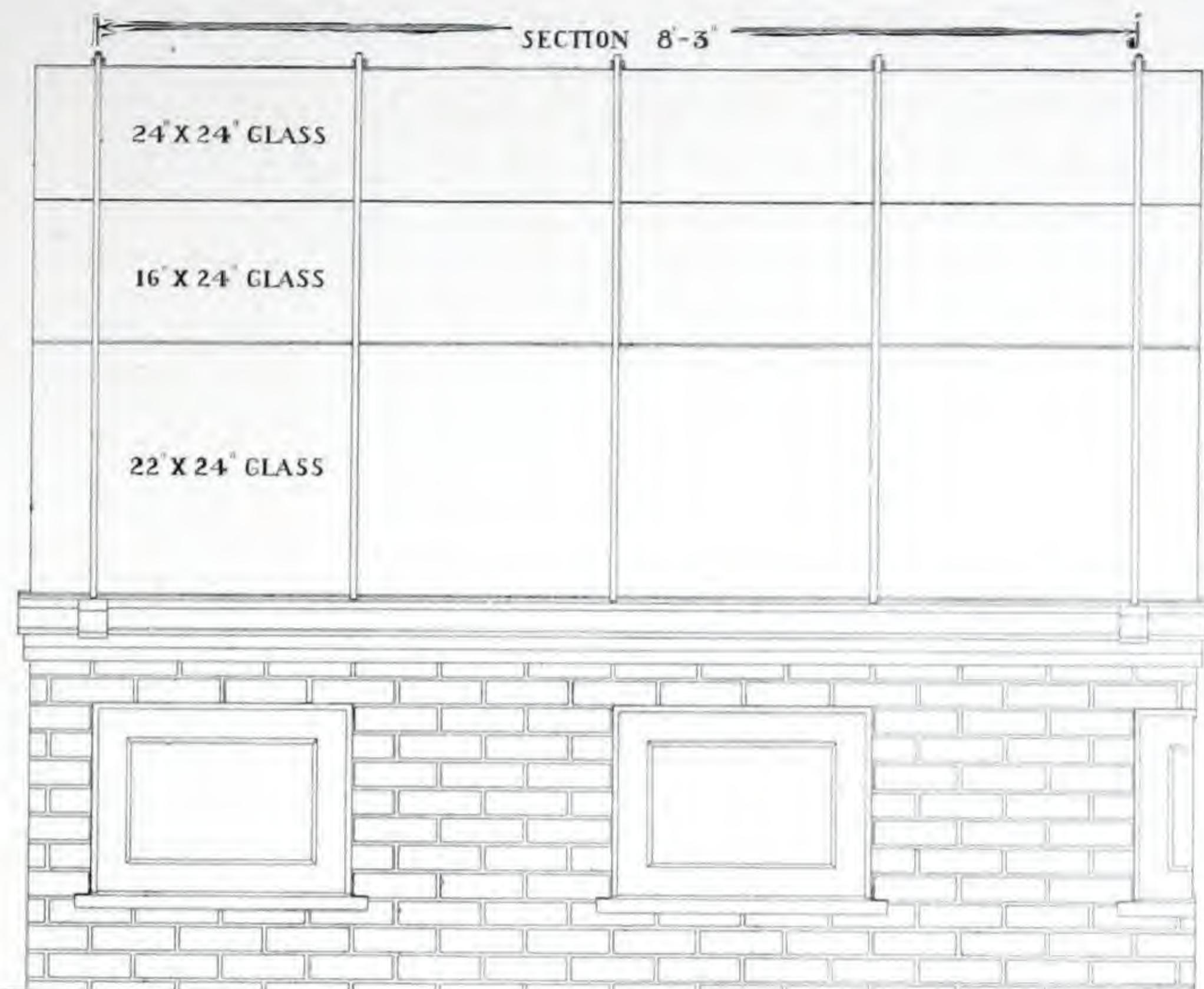
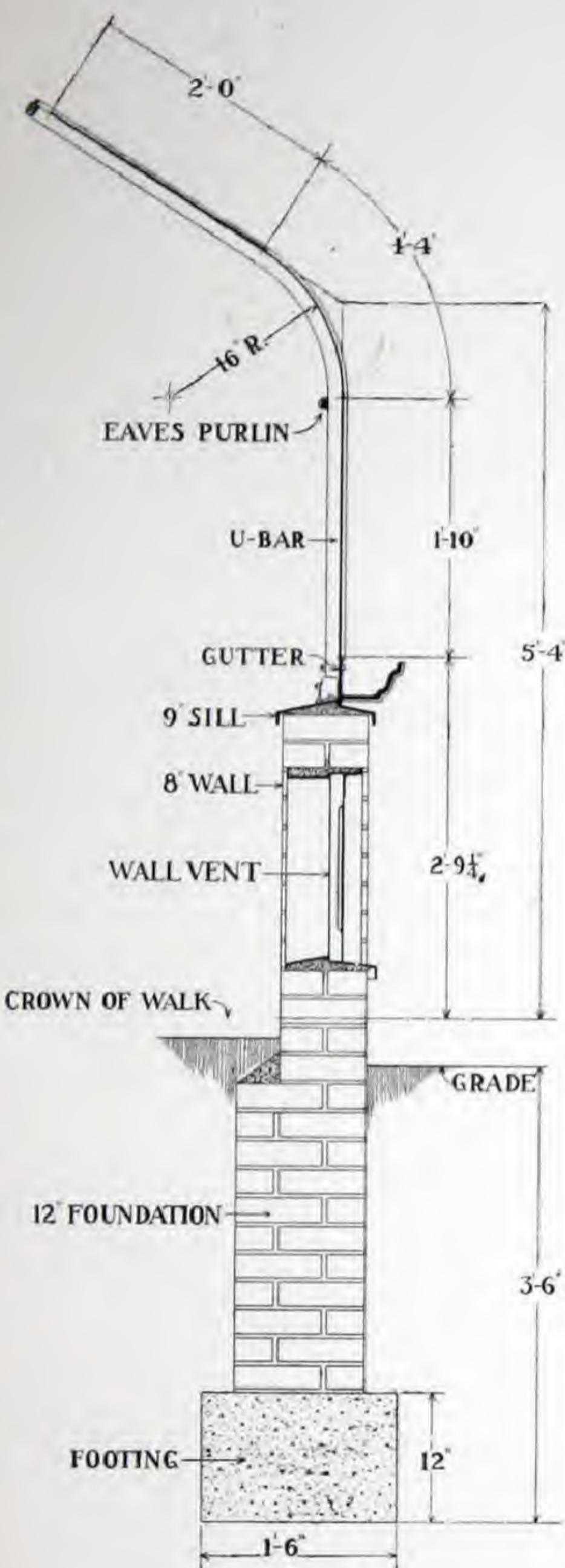
Side-Wall Construction

Type A

Showing concrete footing, brick wall capped with combined cast iron sill and gutter. U-Bars bolted direct to sill and gutter. Used in house shown on page 5.



Perspective View

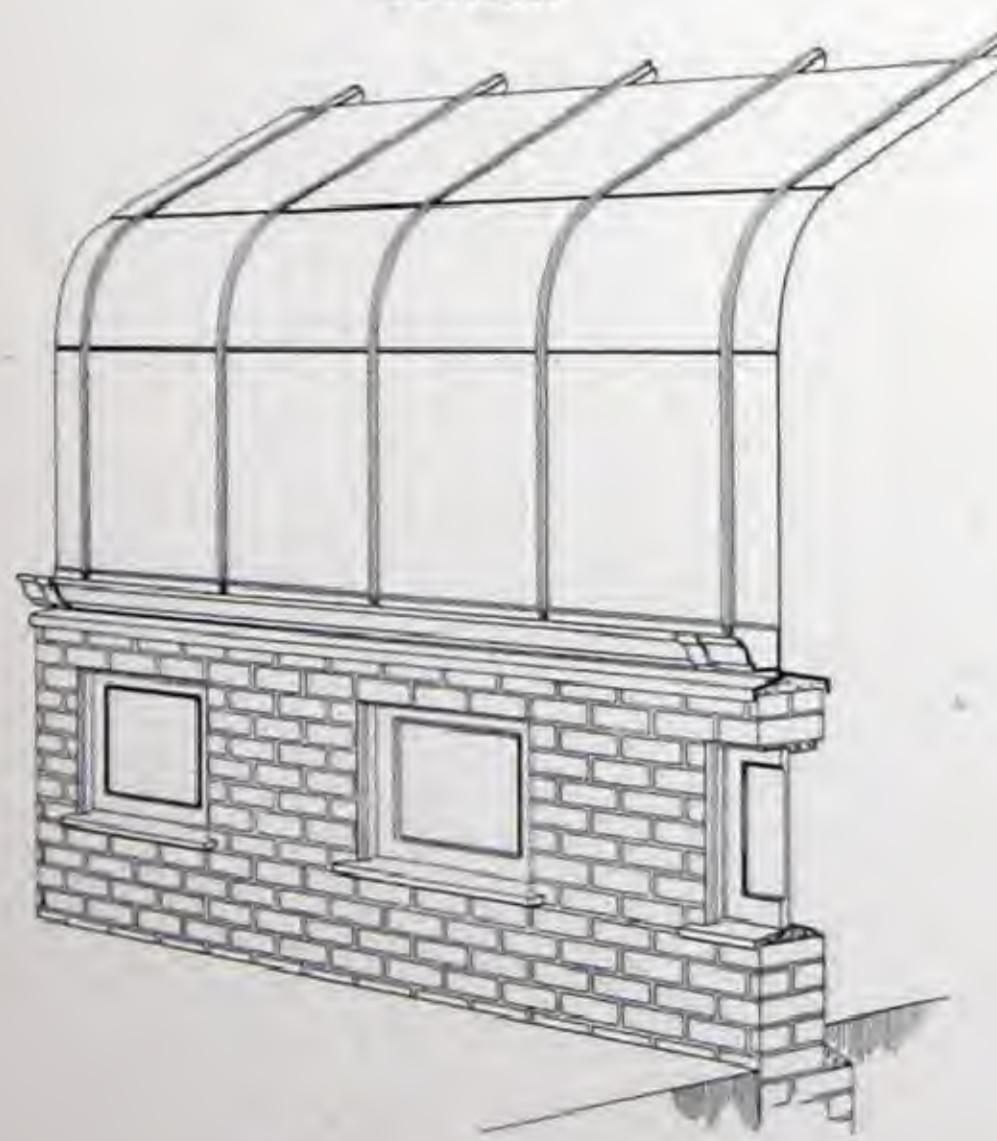


Elevation

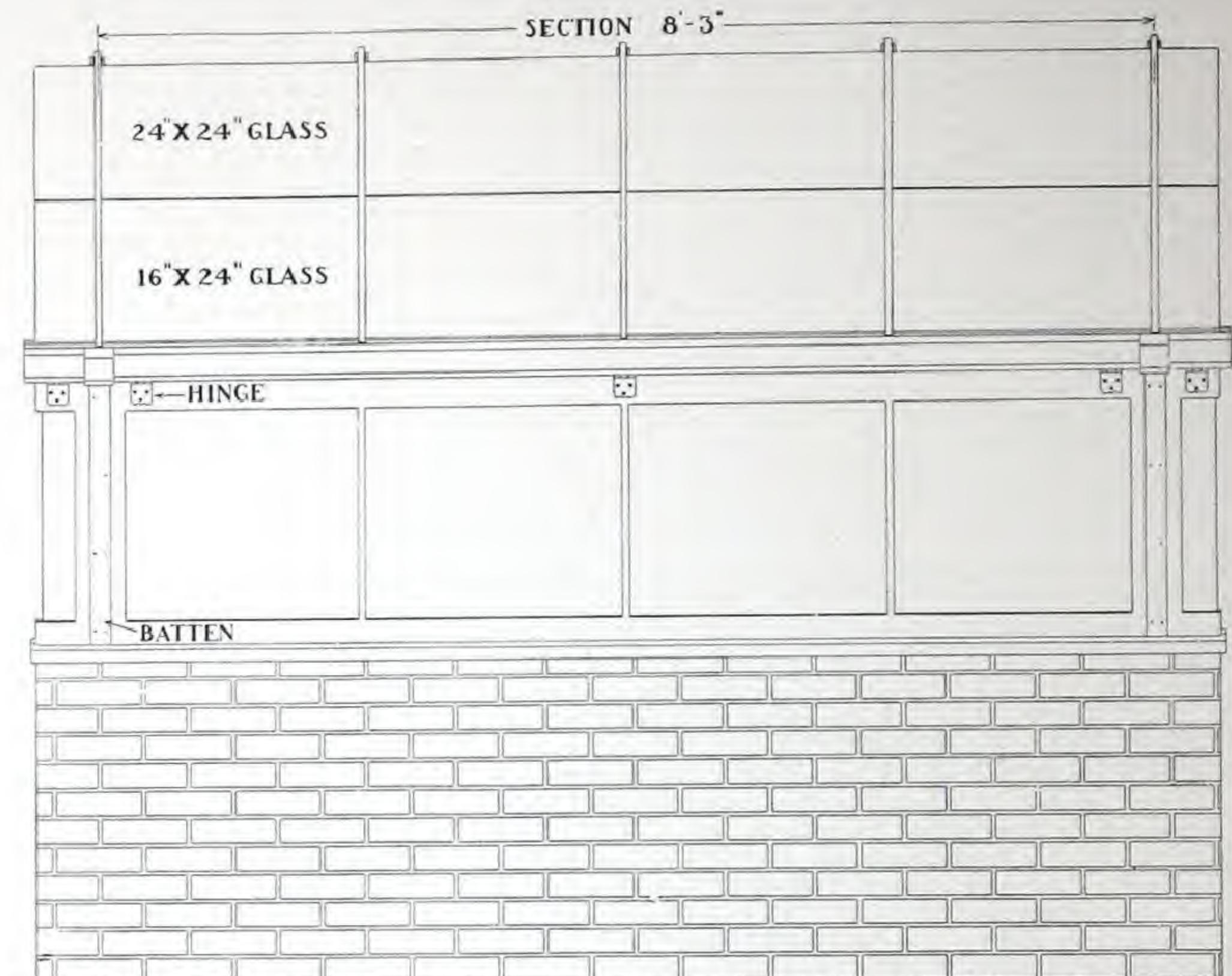
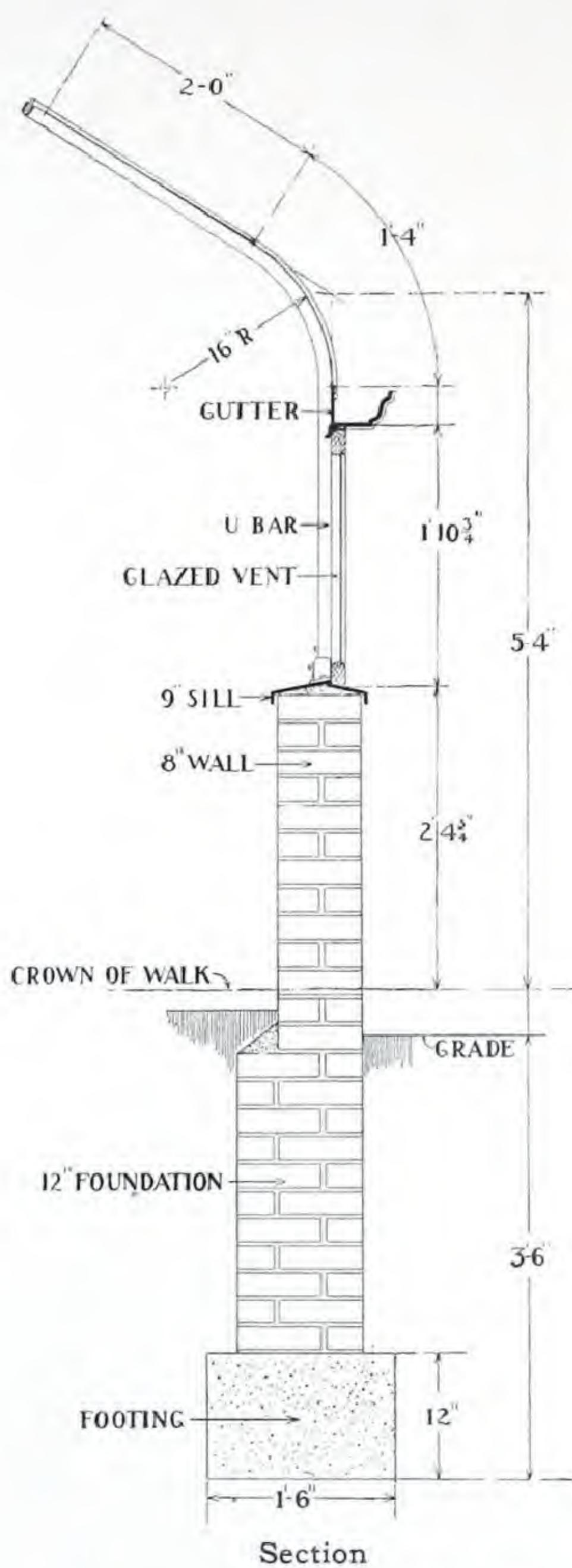
Side-Wall Construction

Type B

Showing concrete footing, brick wall capped with combined cast iron sill and gutter, and fitted with wall ventilators. U-Bars bolted direct to sill and gutter.

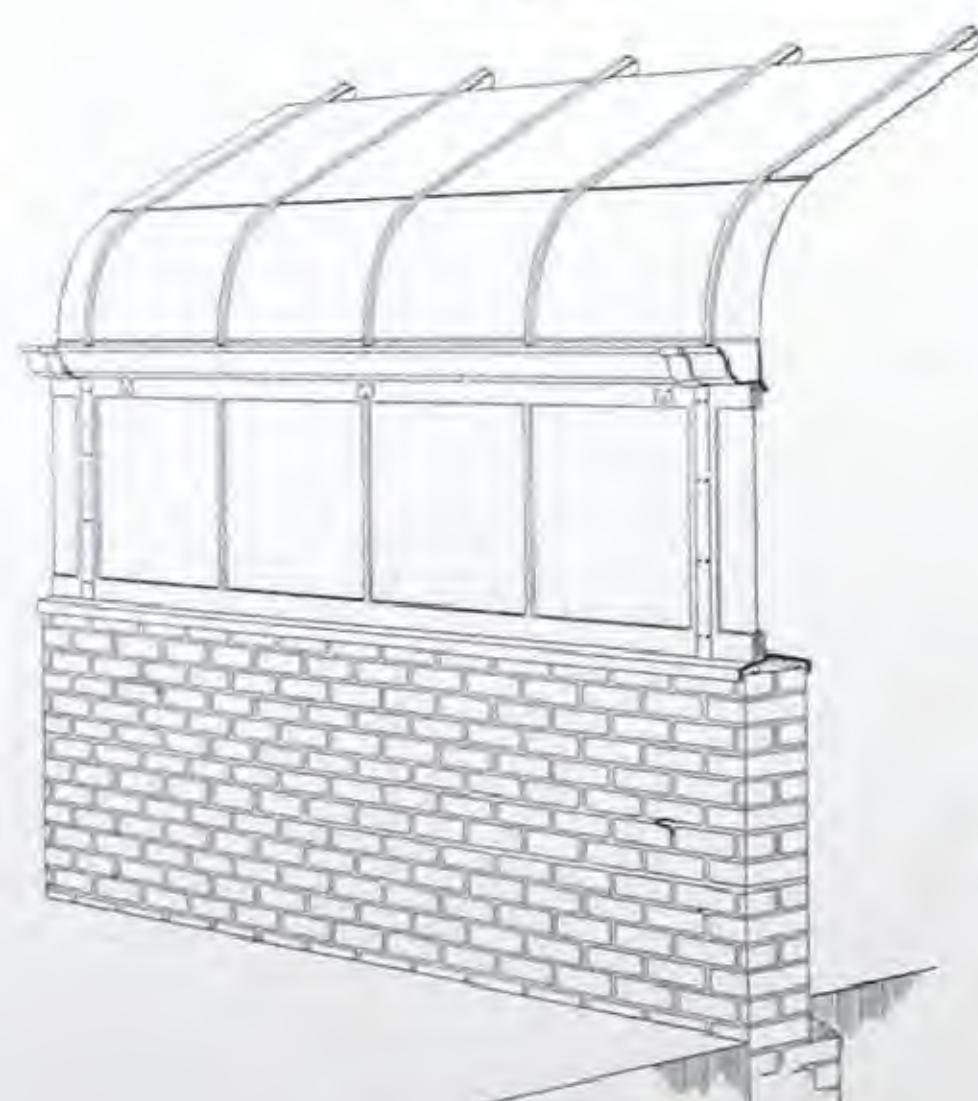


Perspective View

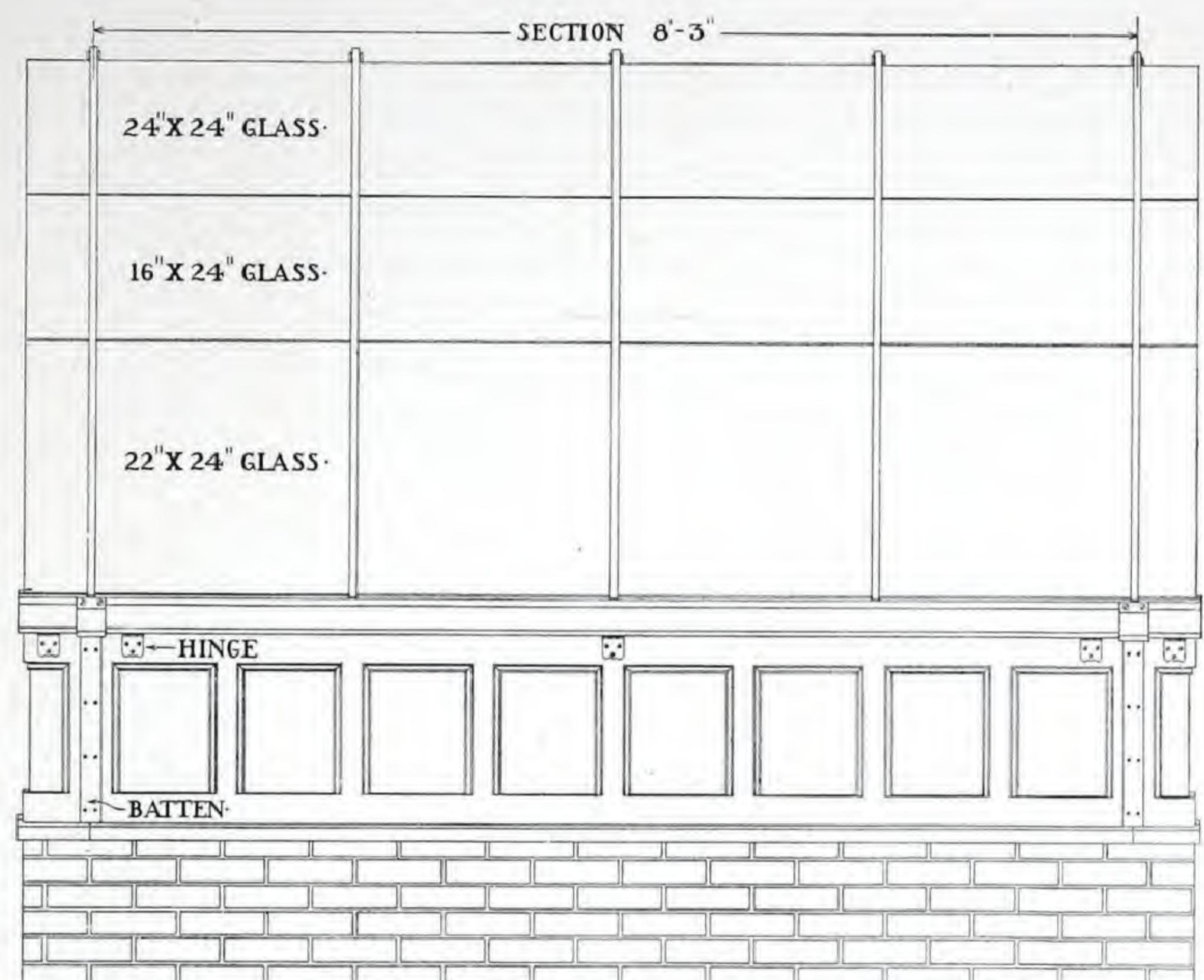
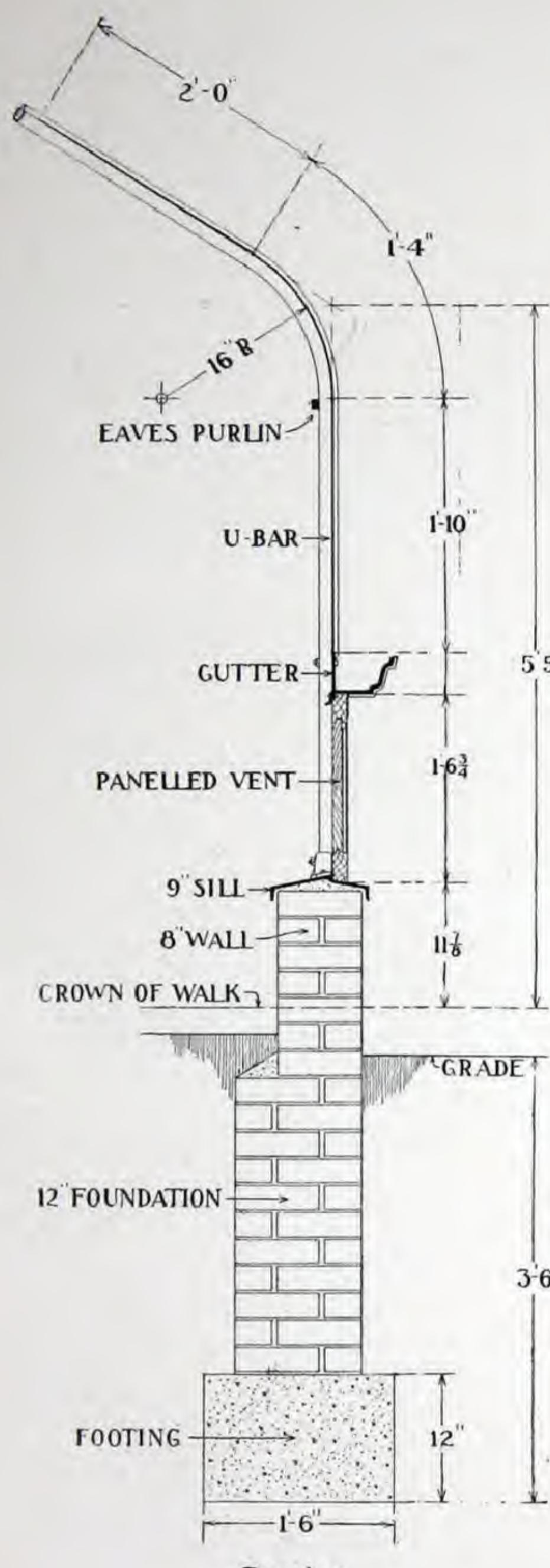


Side-Wall Construction

Type C



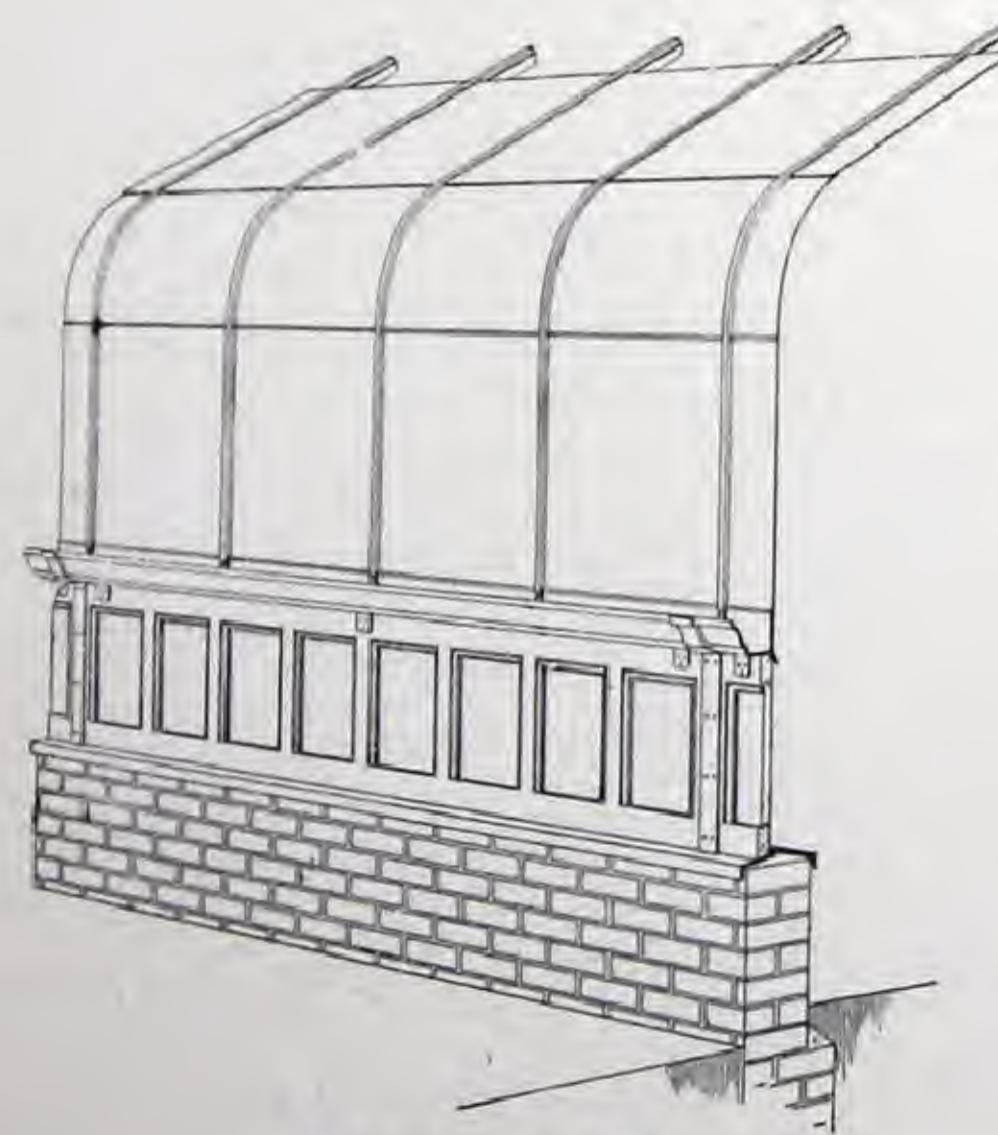
Showing concrete footing, brick wall capped with cast iron sill, and cast iron gutter below eave line. Ventilating sash hinged to gutter. Used in houses shown in lower illustration page 71.

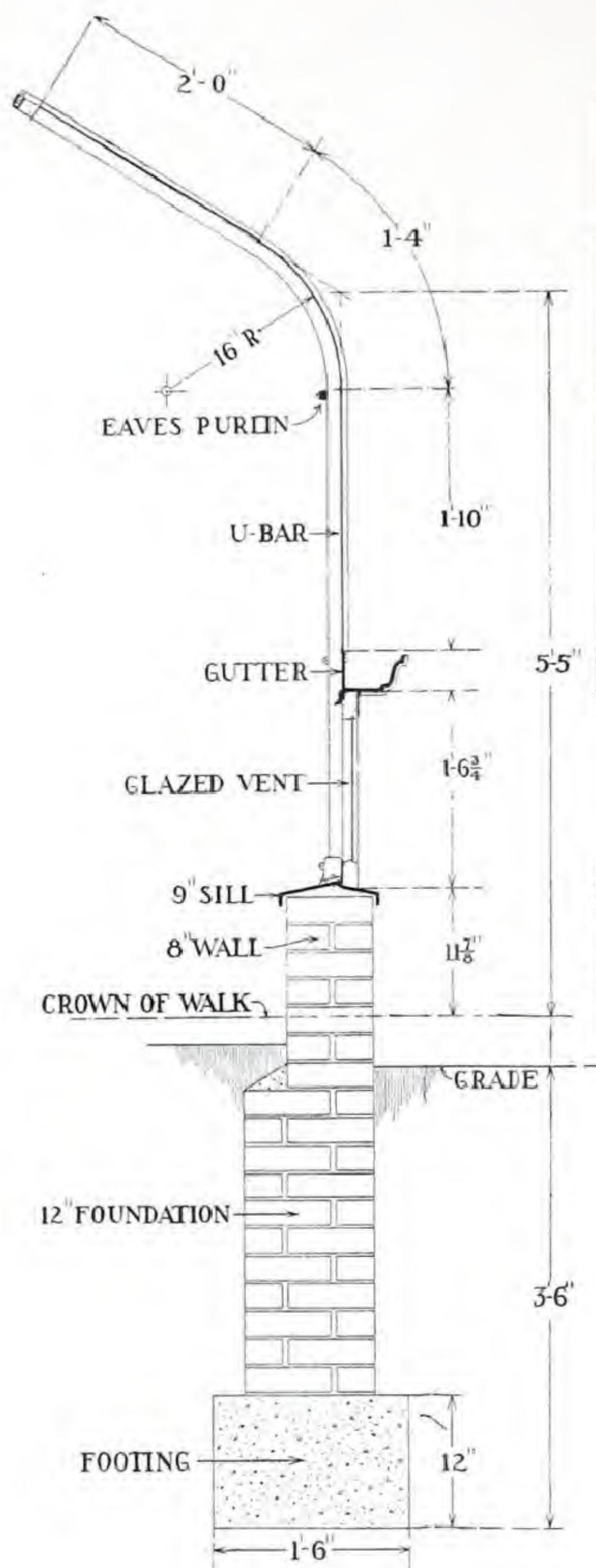


Side-Wall Construction

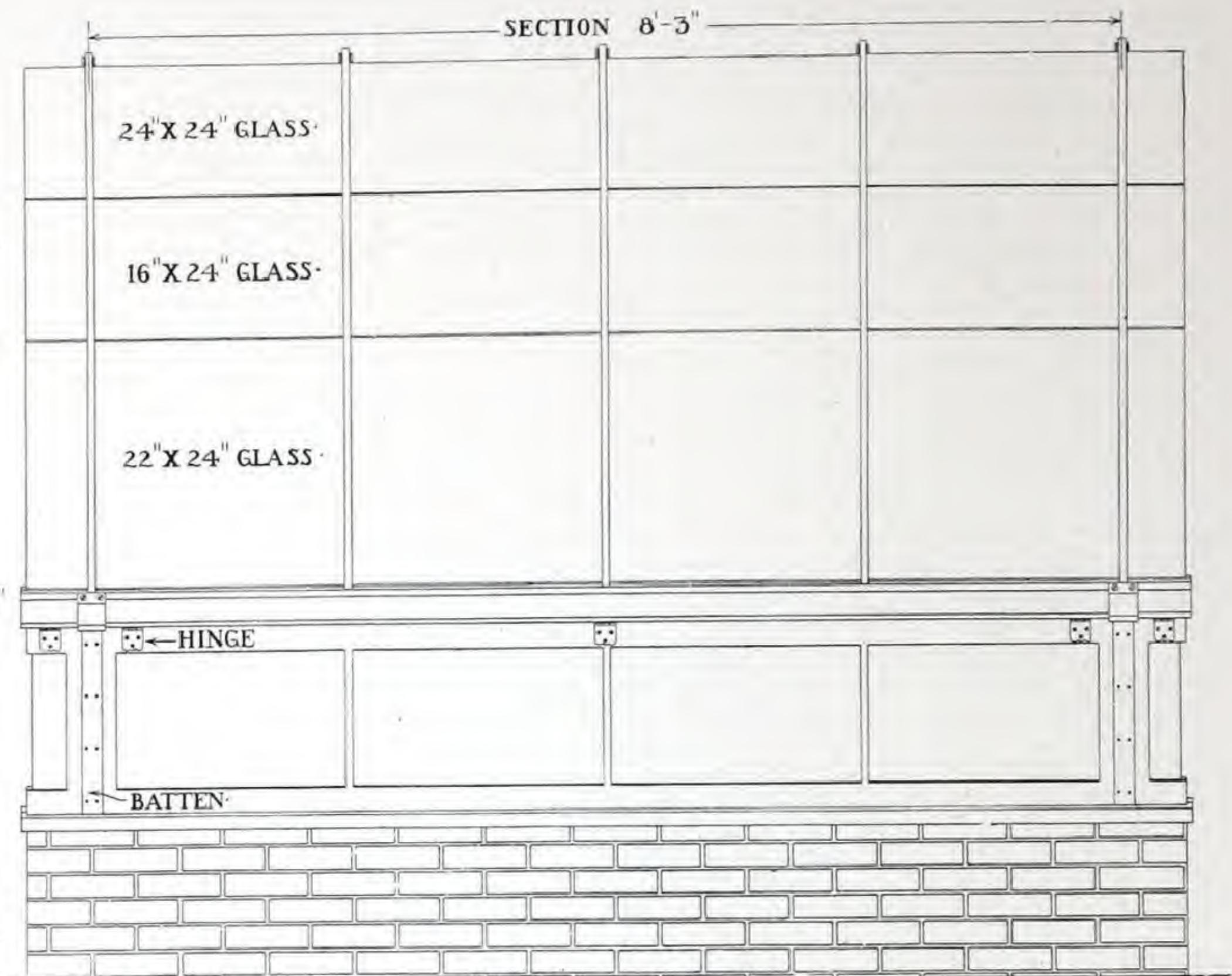
Type D

With concrete footing, low brick wall, capped with cast iron sill, ventilating panel between sill and gutter. Used on houses pages 9 and 13.





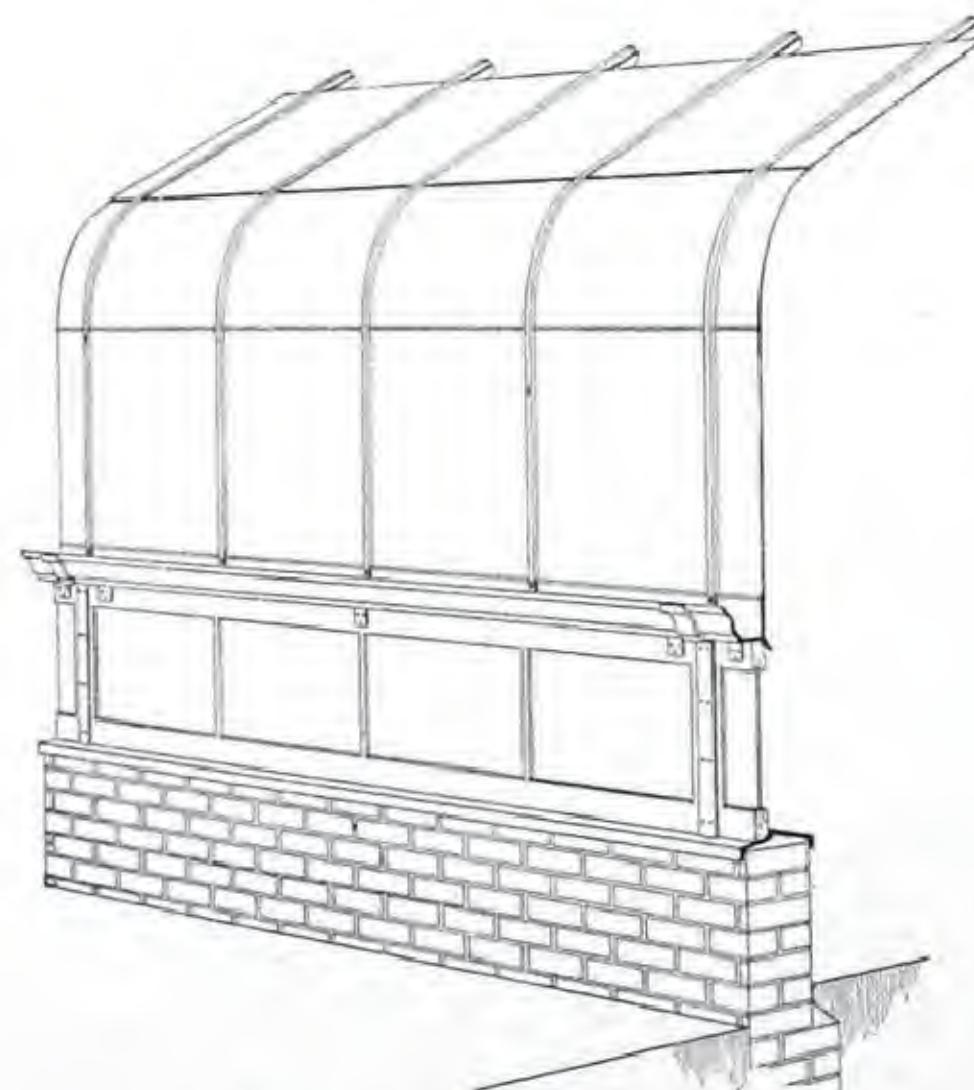
Section



Elevation

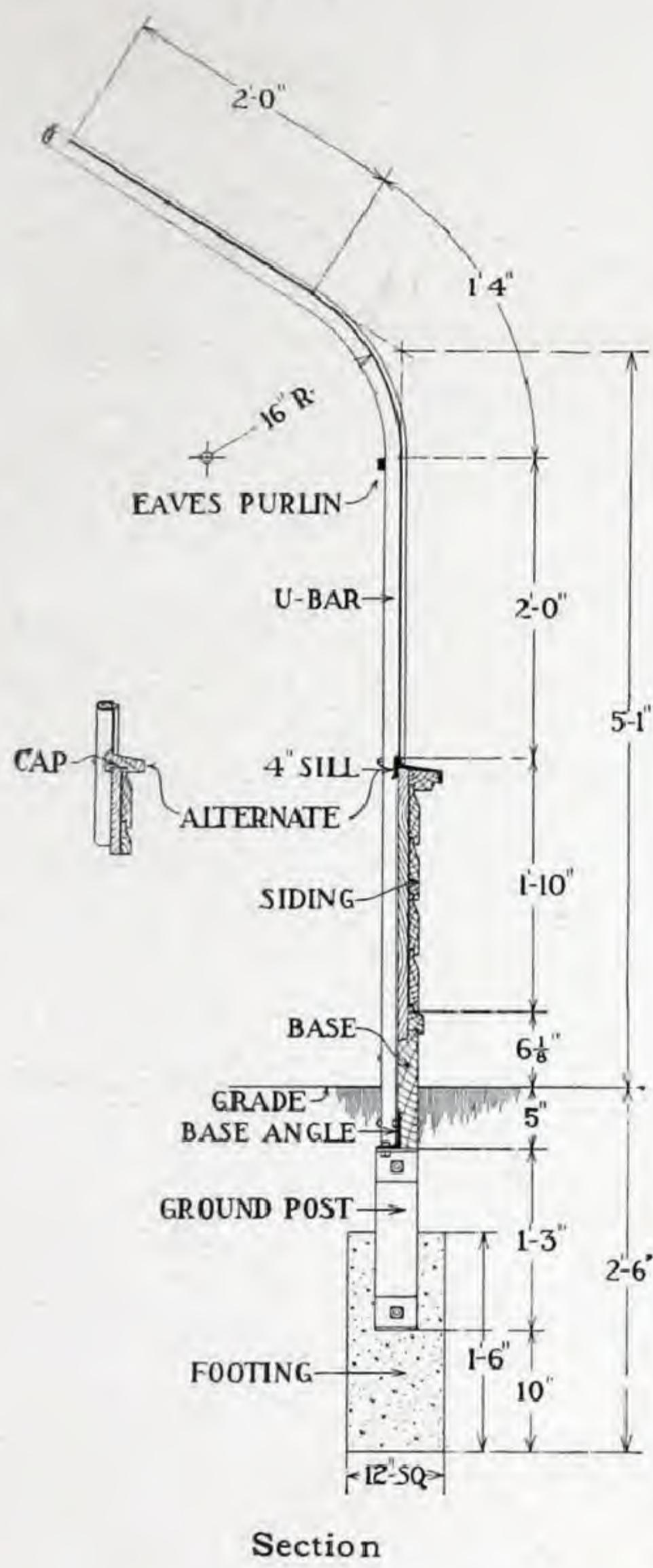
Side-Wall Construction

Type E

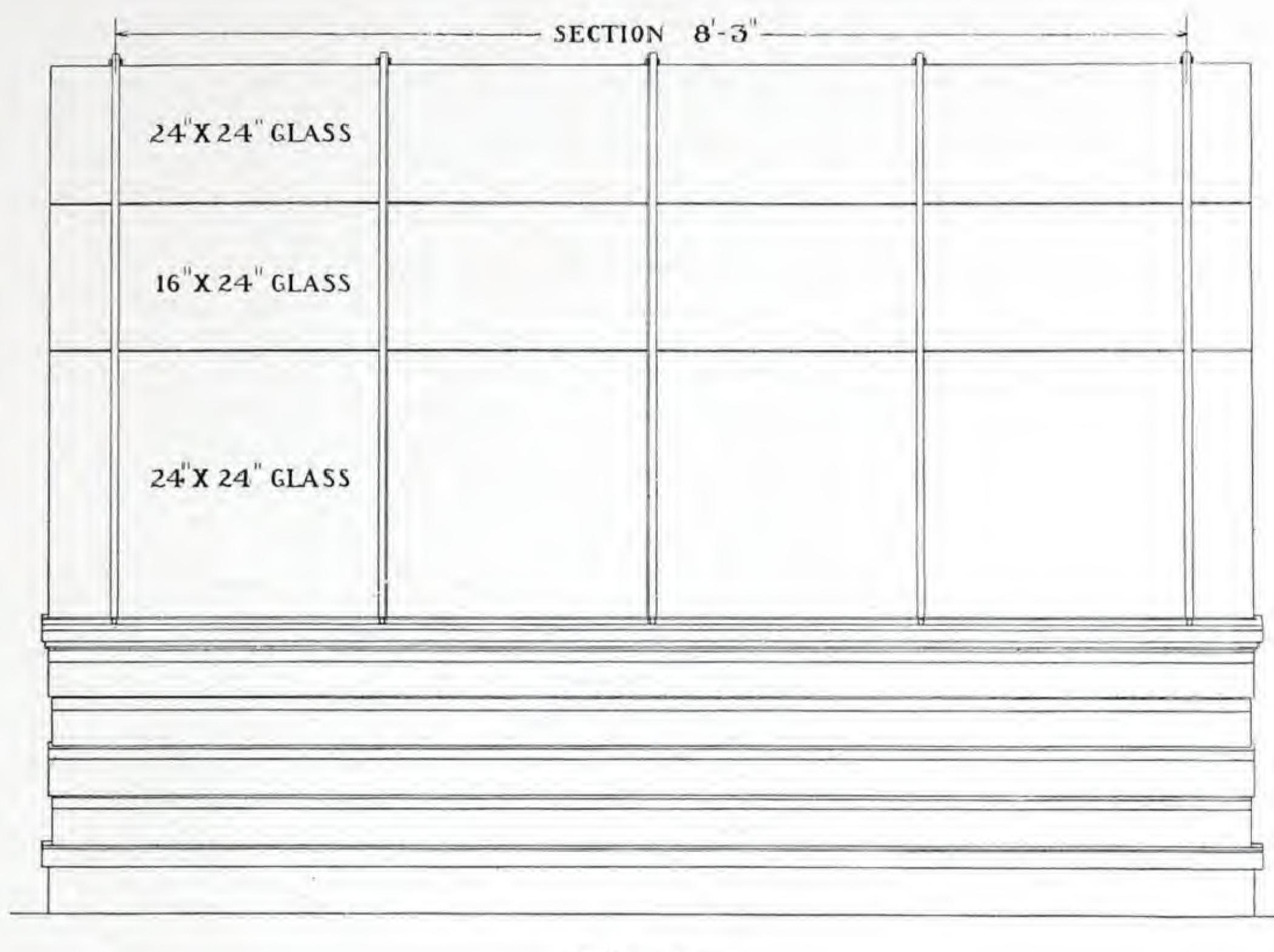


Perspective View

With concrete footings, low brick walls, capped with cast iron sill, ventilating sash between sill and gutter. Particularly adapted for vineeries and peach houses. Used on house page 11.



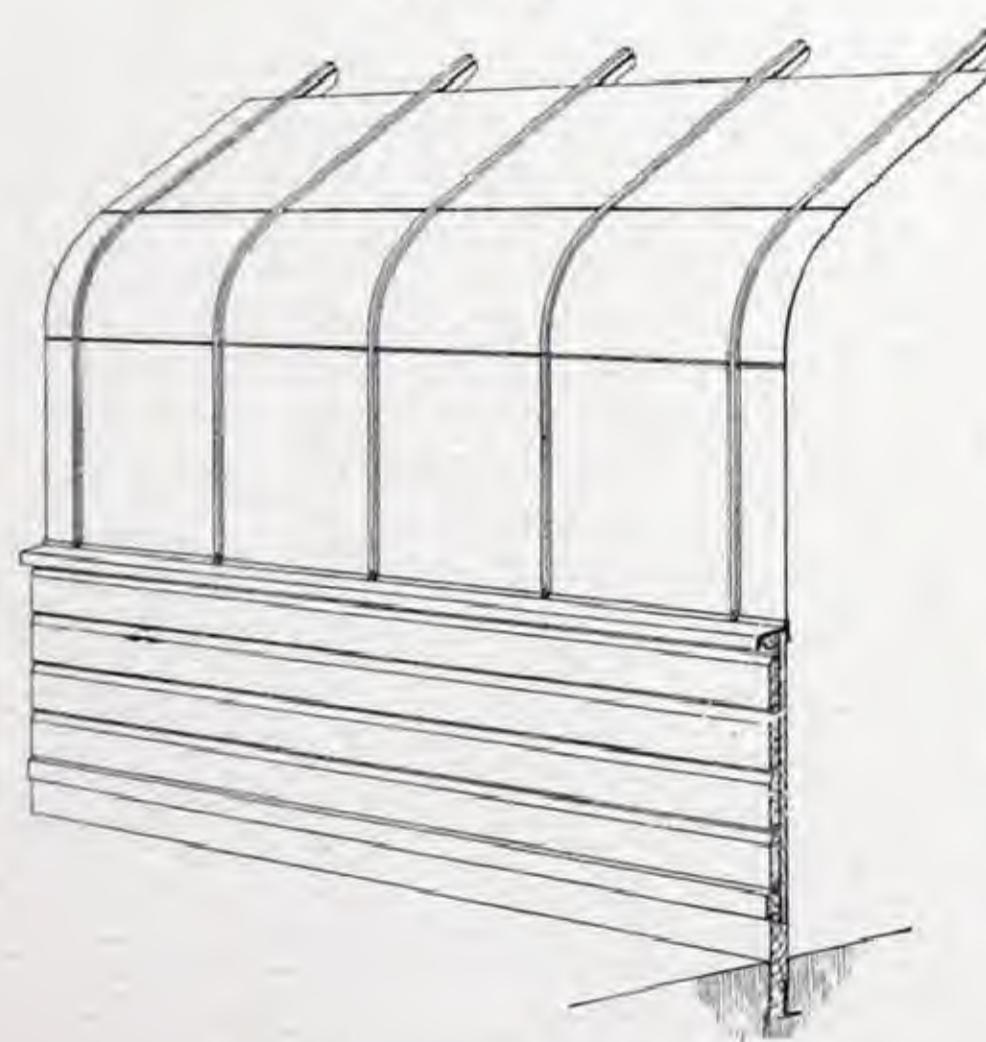
Section



Elevation

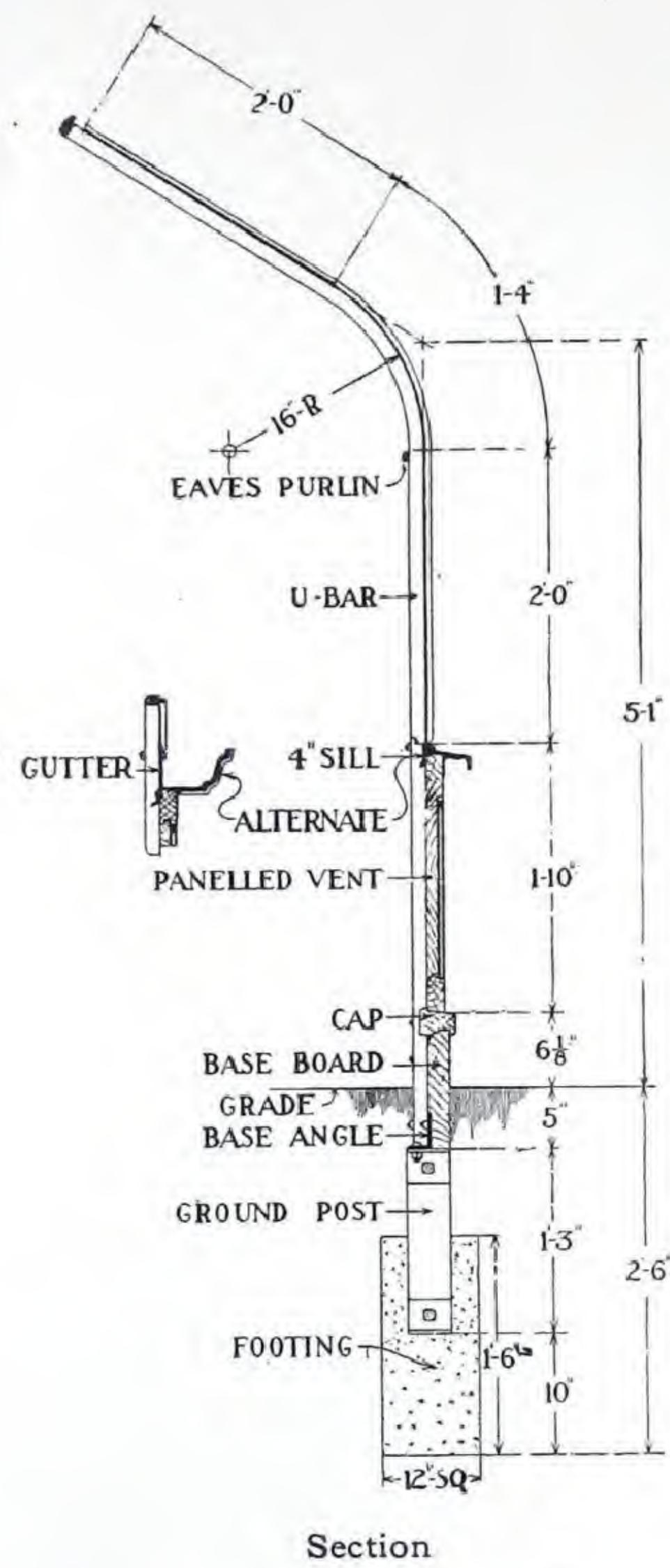
Side-Wall Construction

Type F

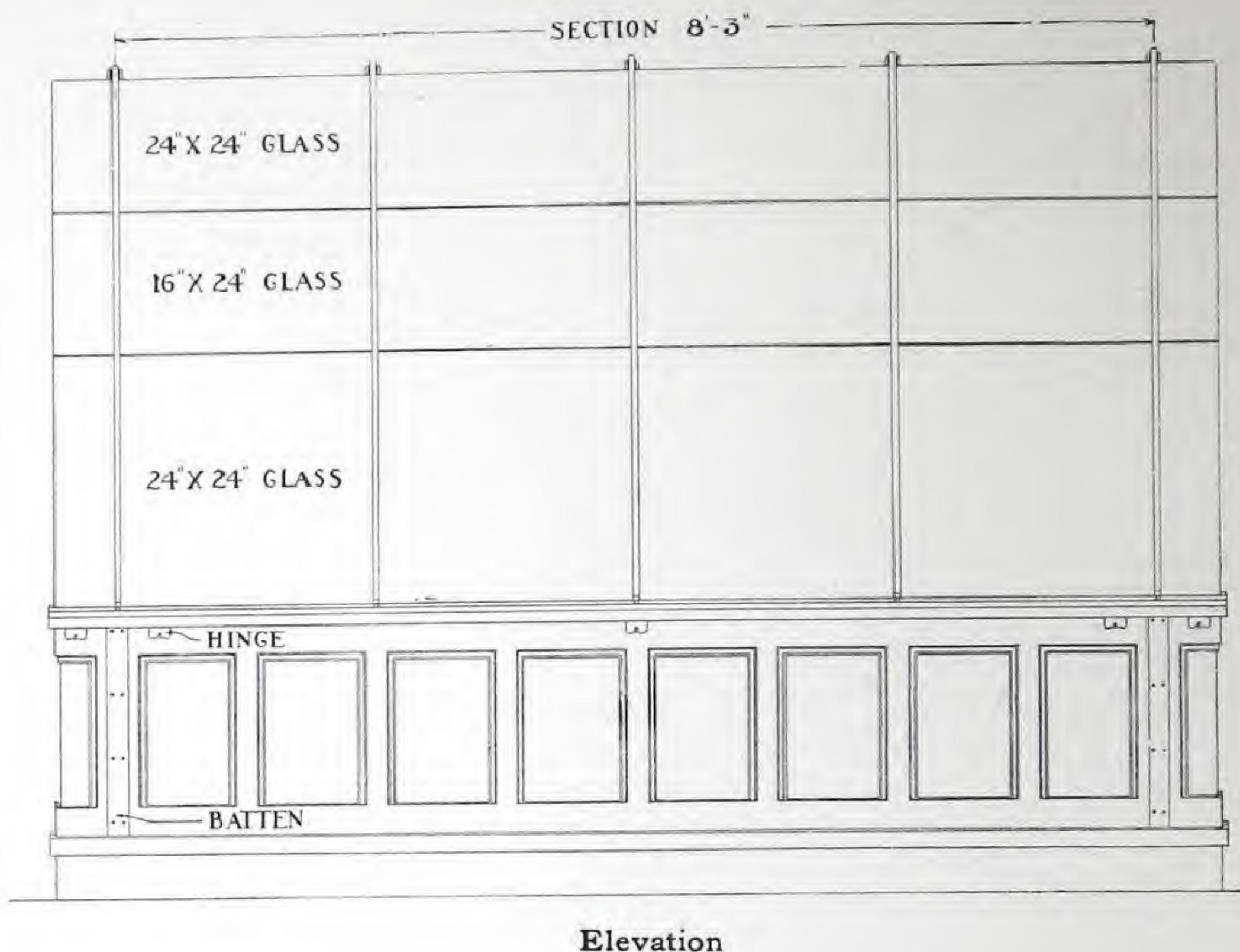


Perspective View

With galvanized iron base angle and ground post embedded in concrete footing. Removable baseboard, double boarded, paper lined, transverse sides, iron sill or wood cap. The simplest and cheapest form of construction; used where masonry foundations are too expensive.

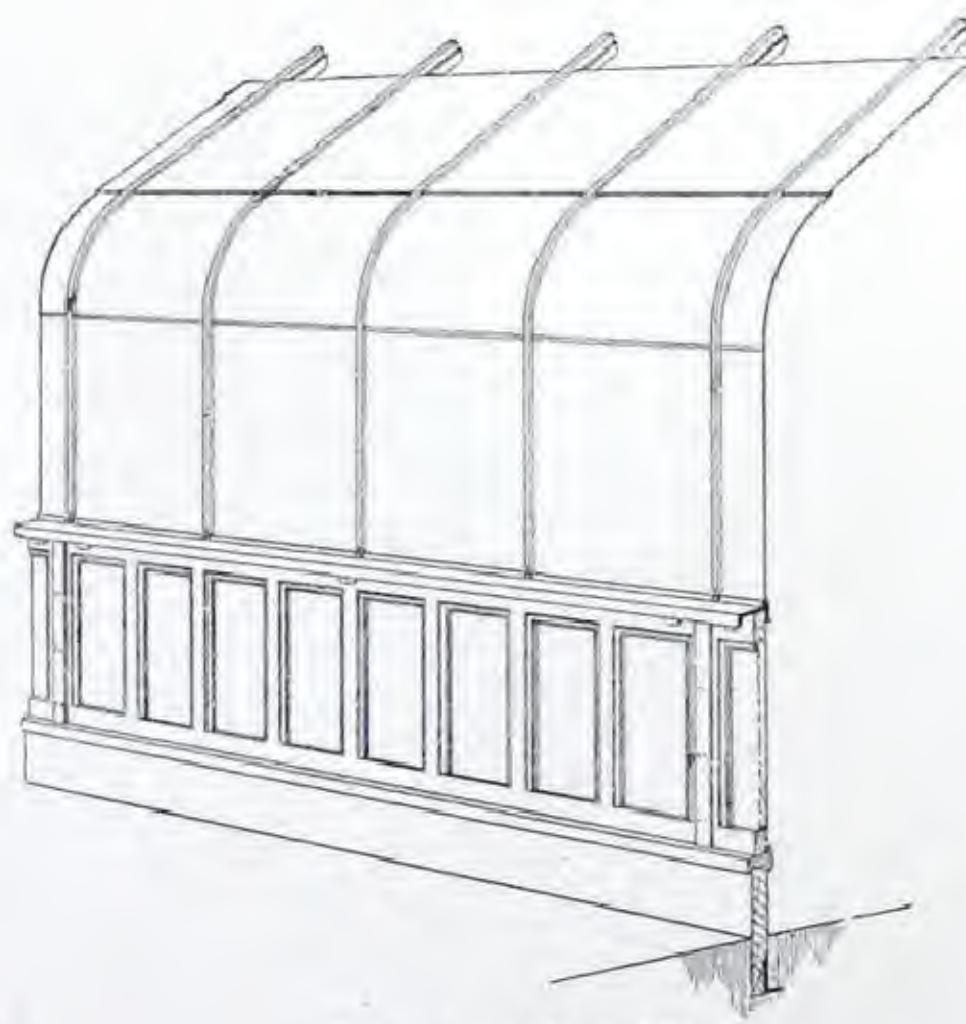


Section



Elevation

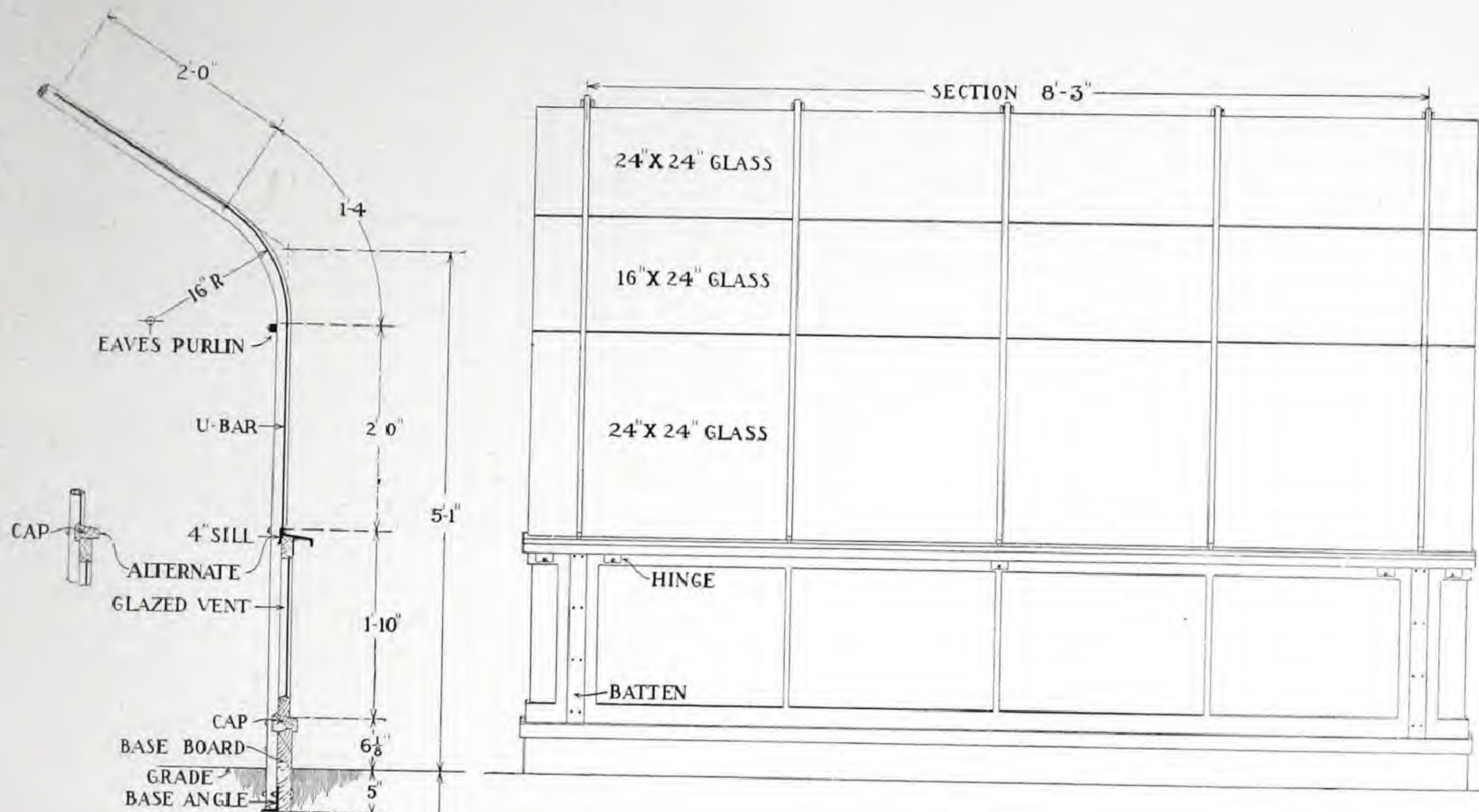
Side-Wall Construction



Perspective View

Type G

With galvanized iron base angle, and ground post embedded in concrete footing. Removable baseboard, ventilating panels, iron sill or gutter capping same. Used where masonry foundations are too expensive.



Side-Wall Construction

Section



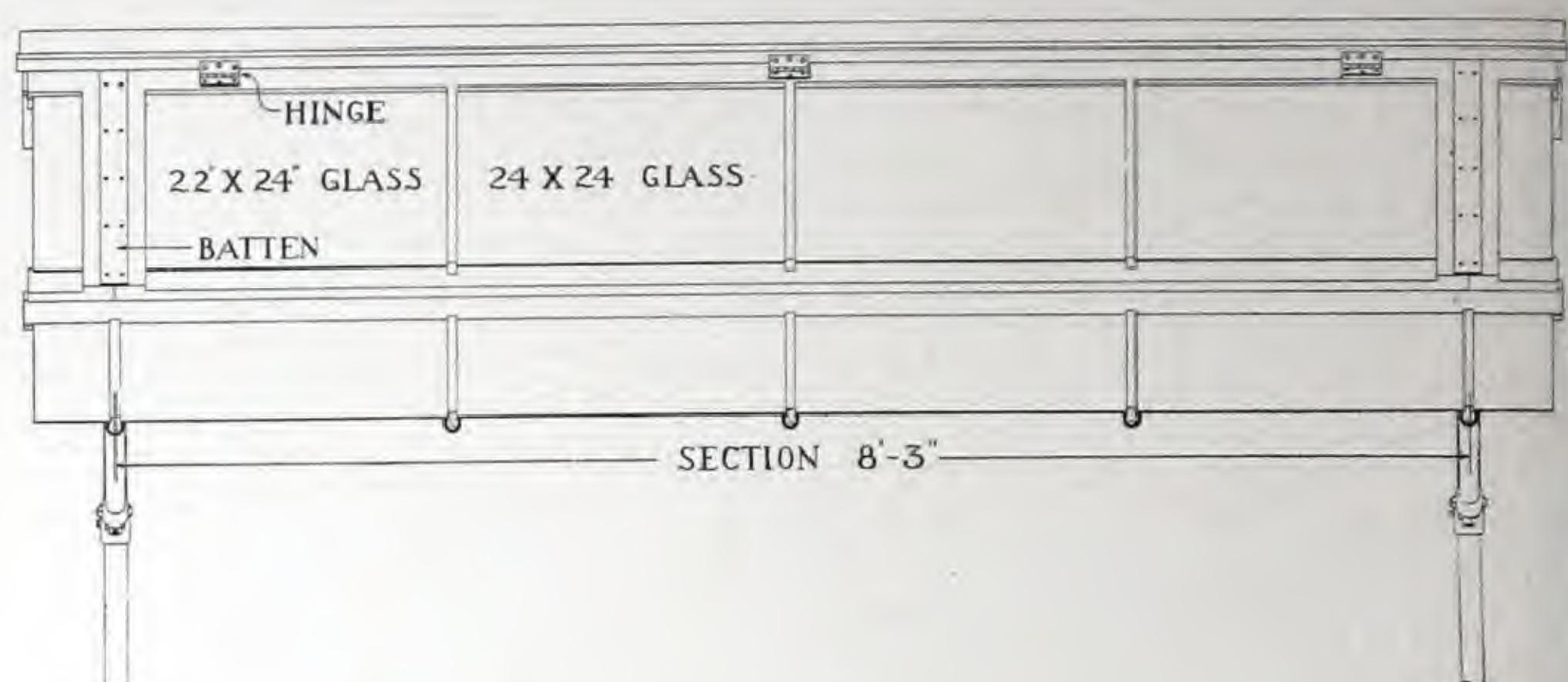
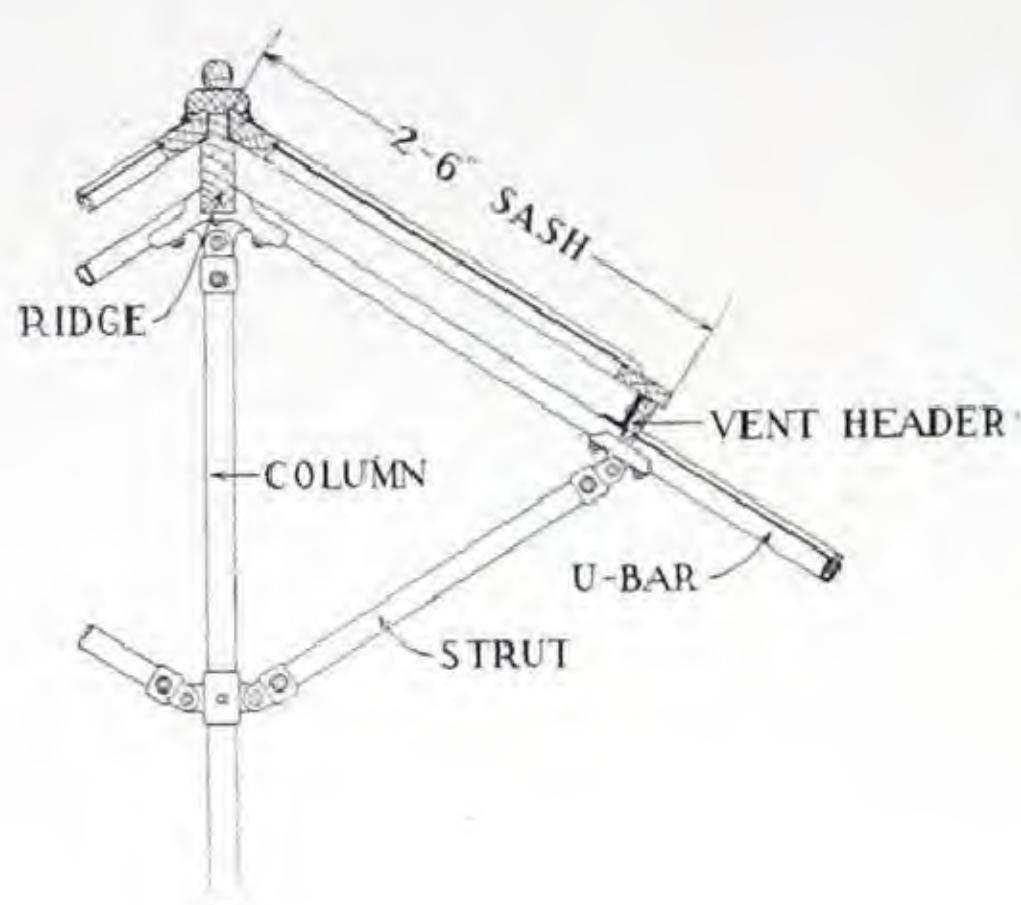
Perspective View

Type H

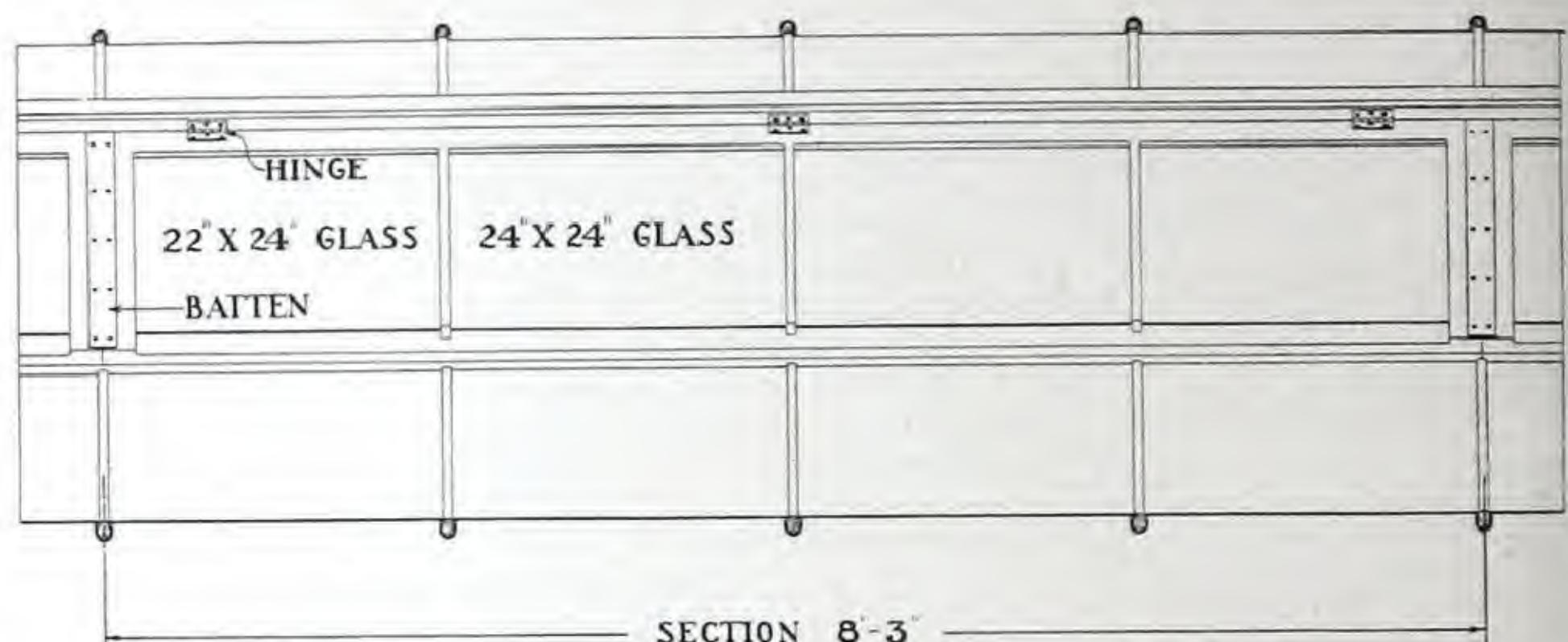
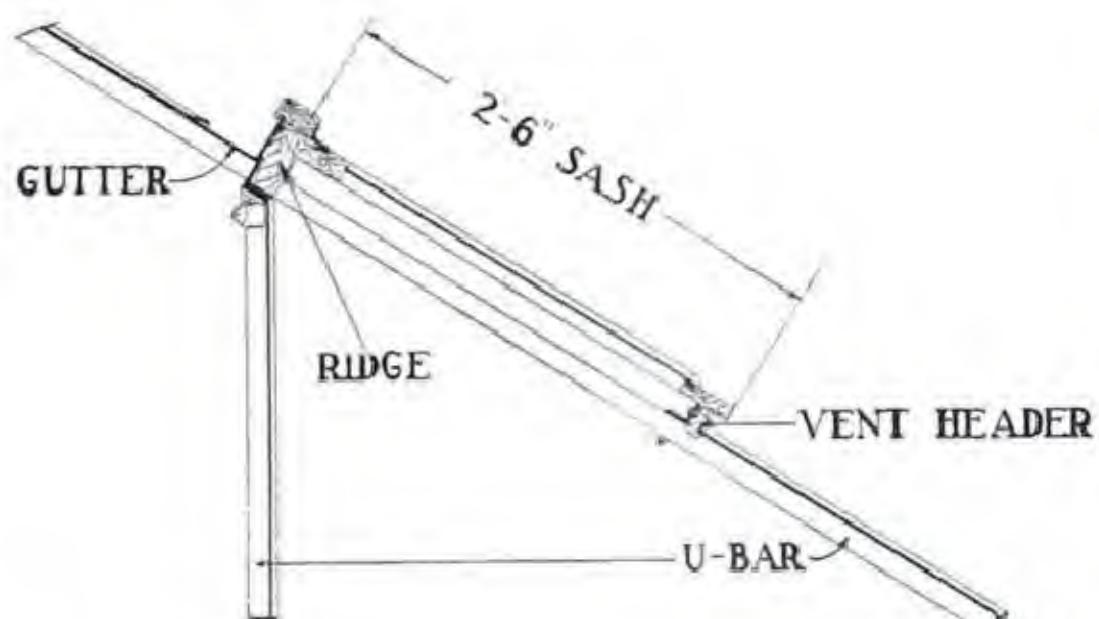
Same as type "G" with sash ventilators substituted for panels. Particularly adapted for vineeries and peach houses.

Ridges

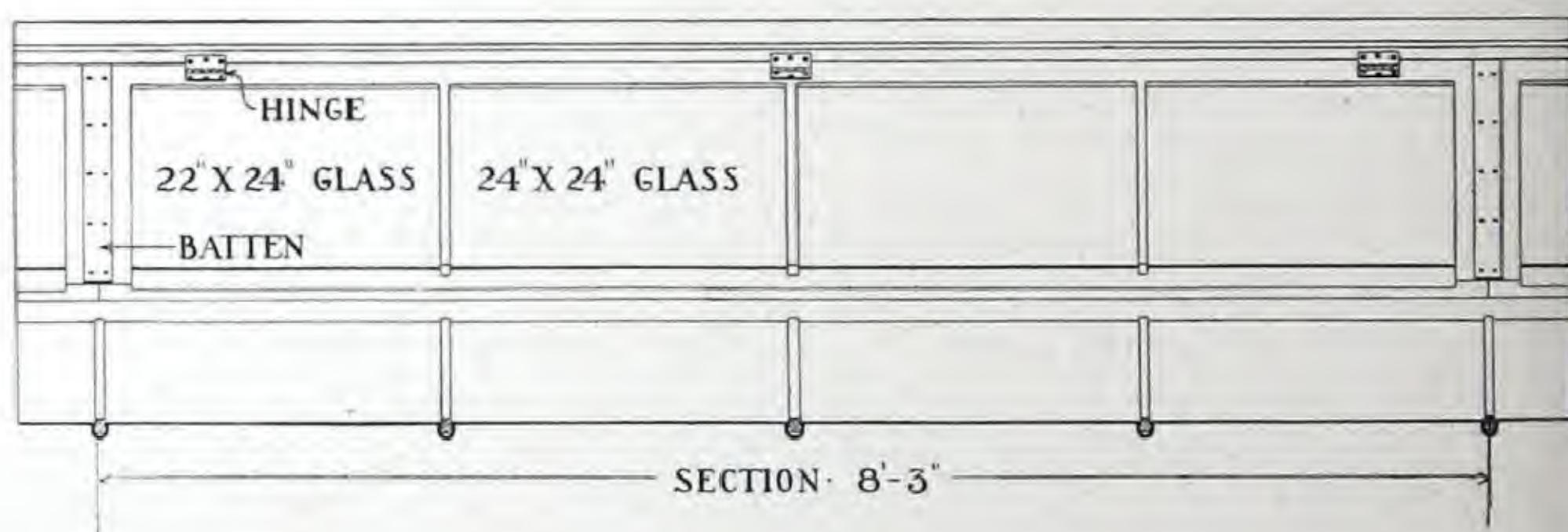
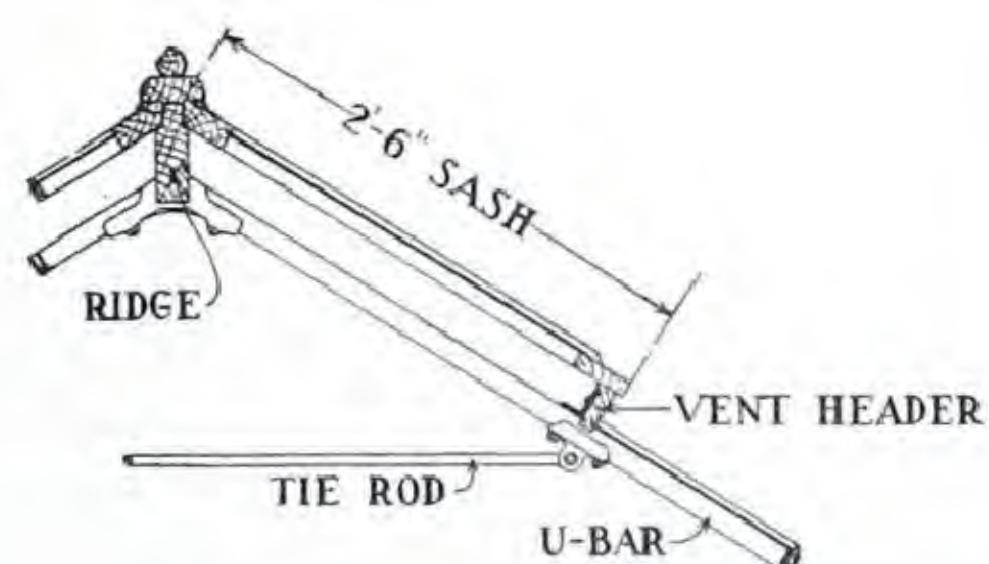
Type A



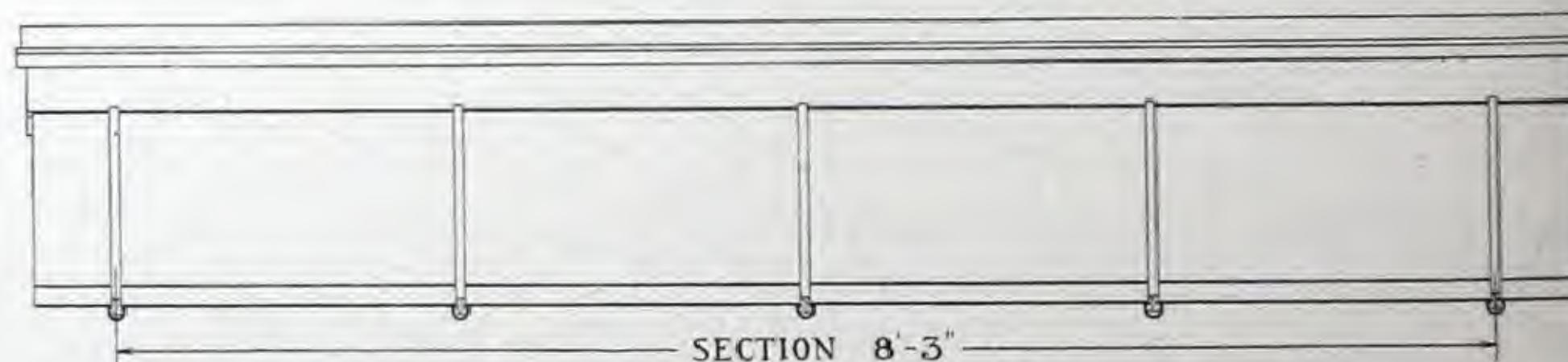
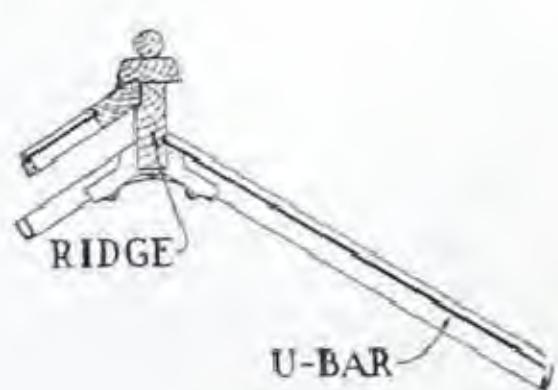
Type B



Type C



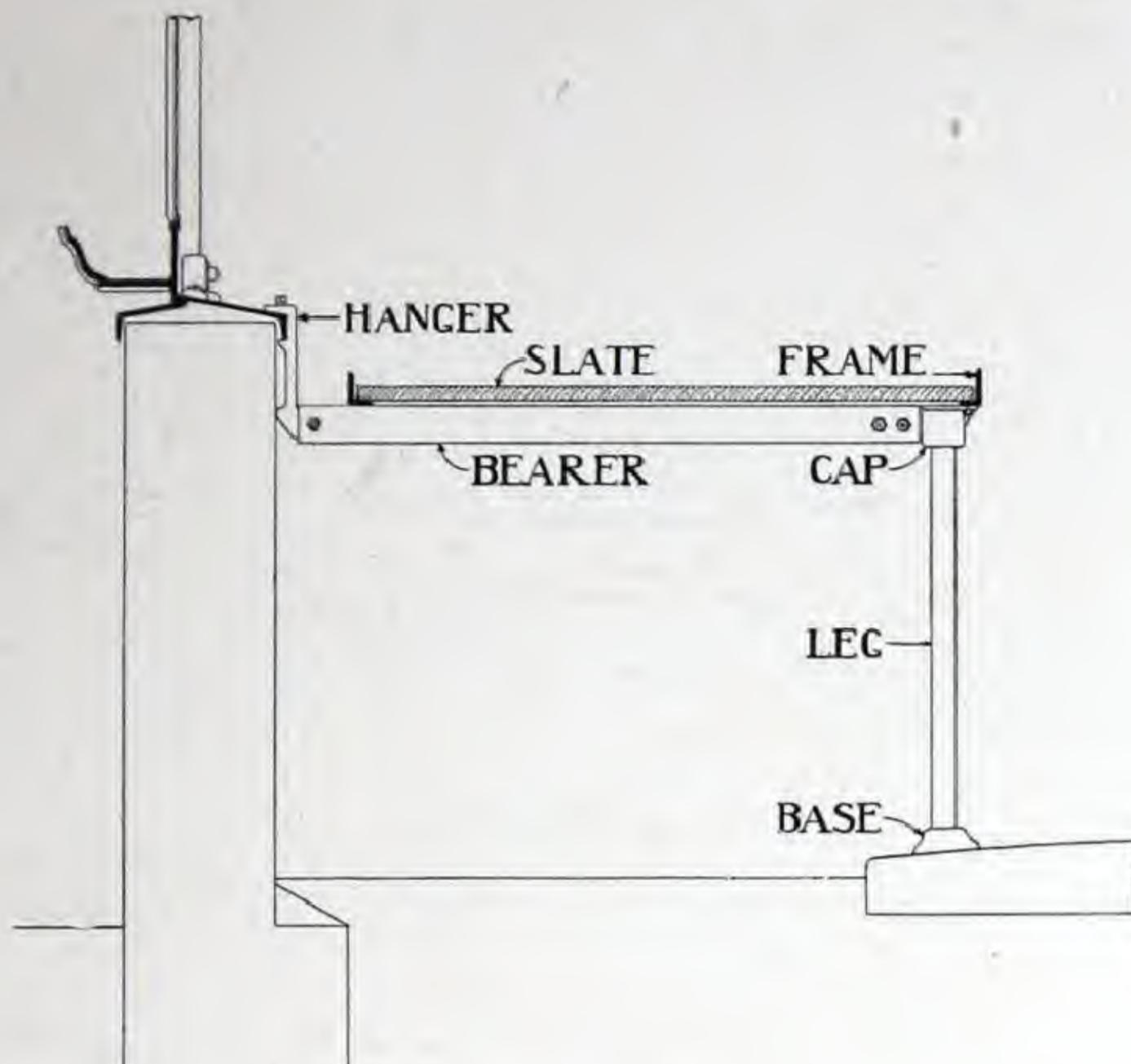
Type D



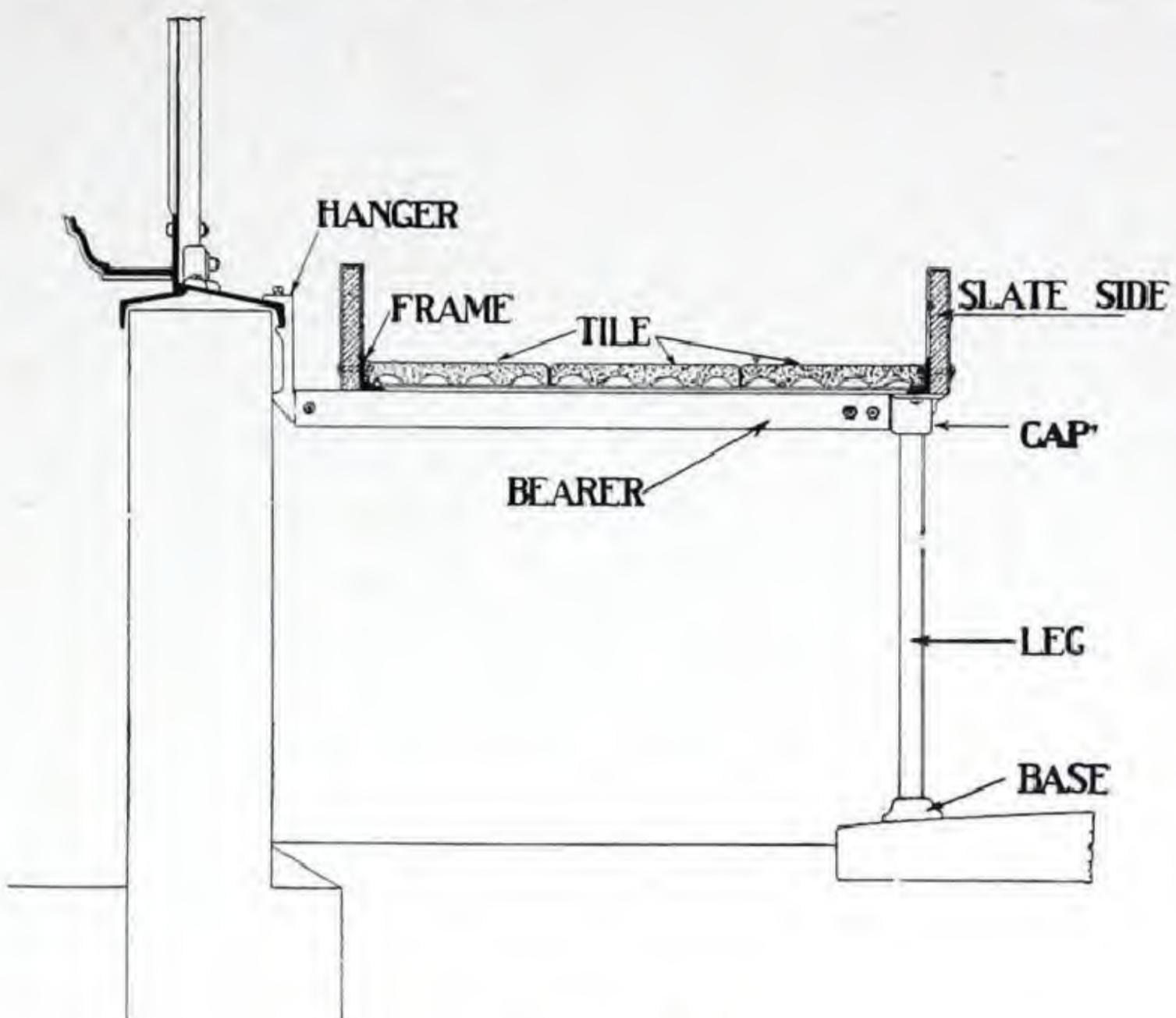
DESCRIPTION

- A—Double ridge ventilation with center column and side struts used as shown in section "G" page 39.
- B—This form of ventilation is employed in combination three-quarter span and lean-to houses as shown in section "J" page 40.
- C—Double ridge ventilation with tie rod used as shown in section "H" page 39.
- D—Single ridge ventilation used as shown in section "F" page 38 and sections "I" and "J", page 40.

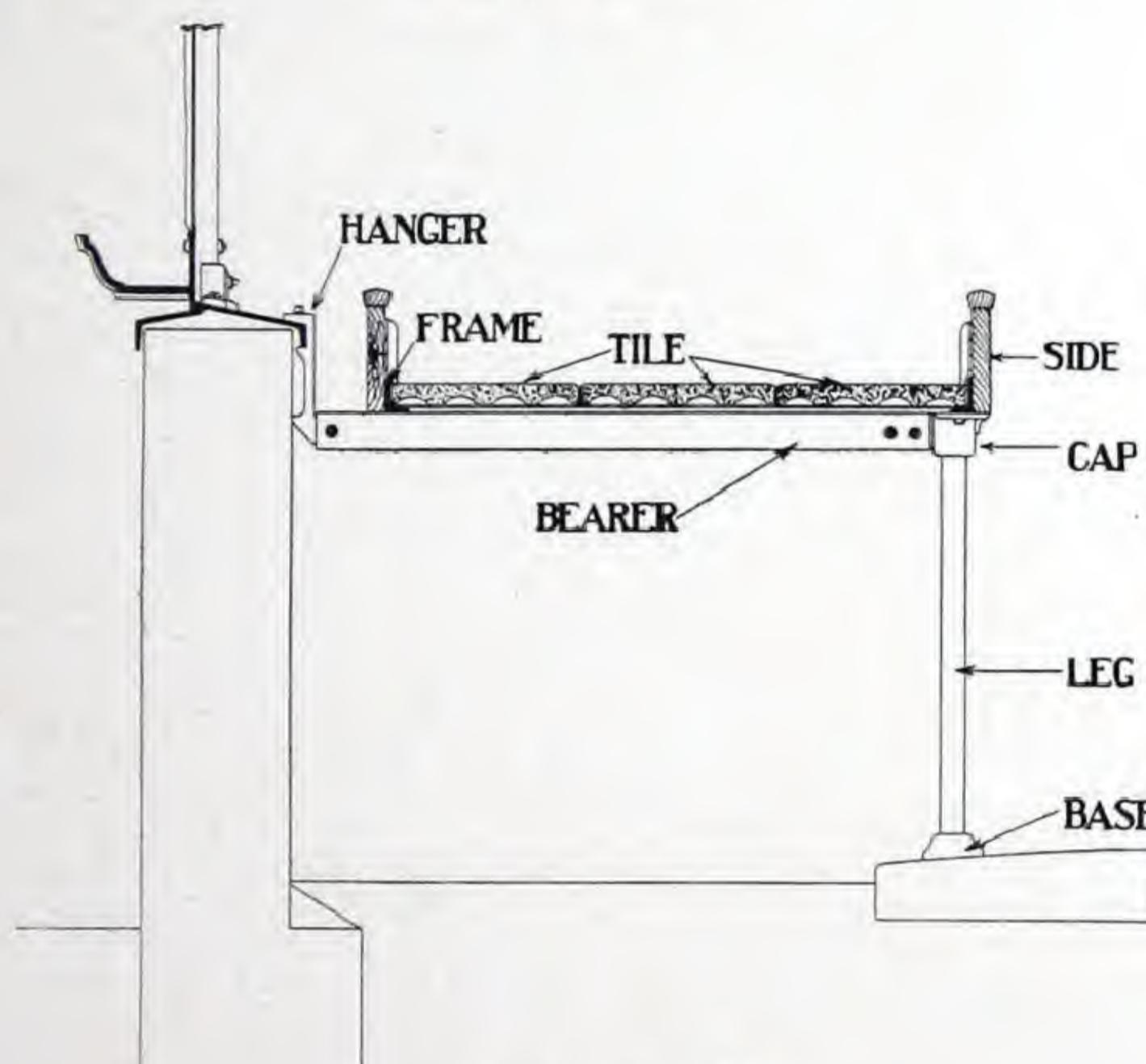
Plant Tables and Beds



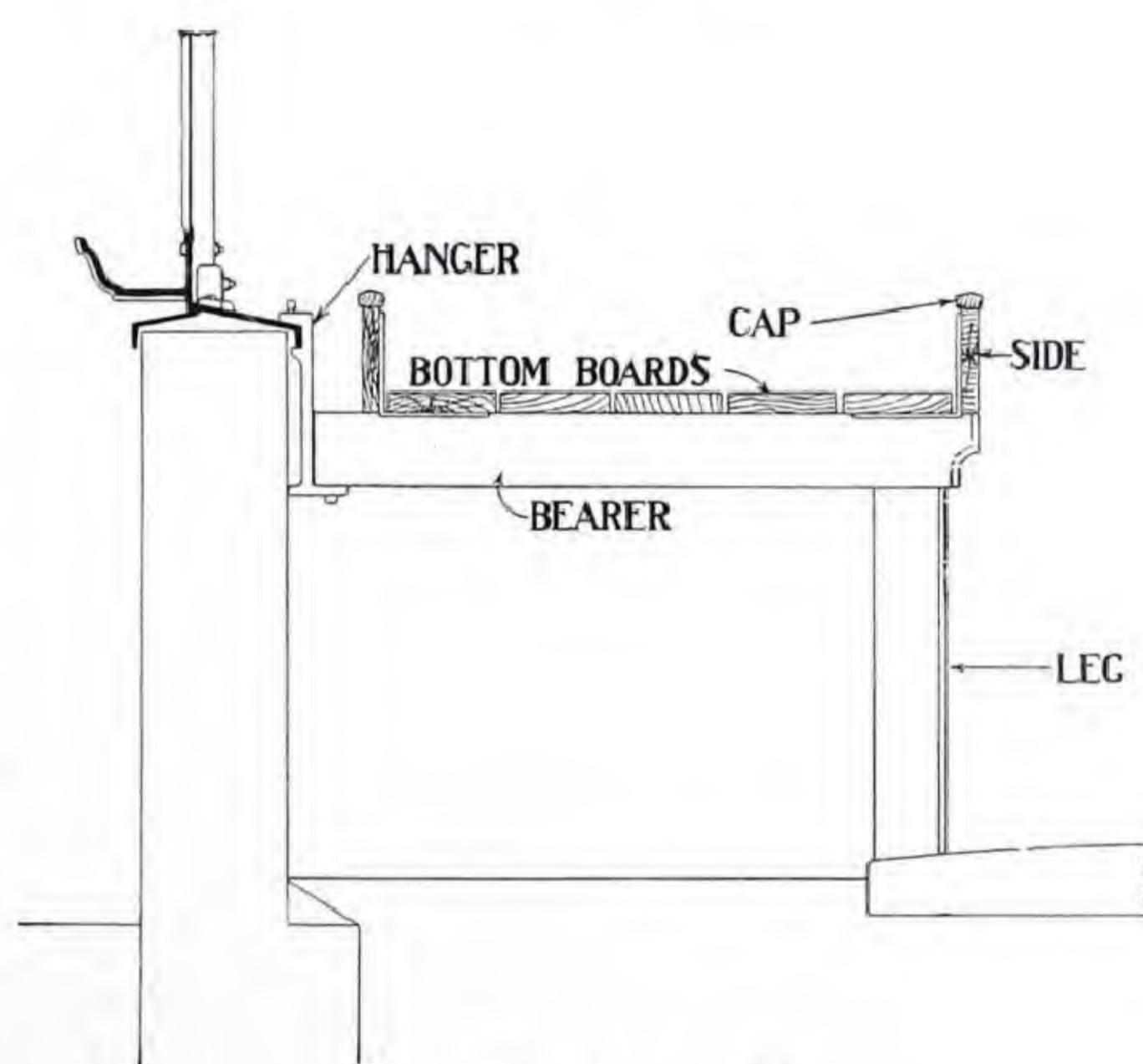
Type A



Type B

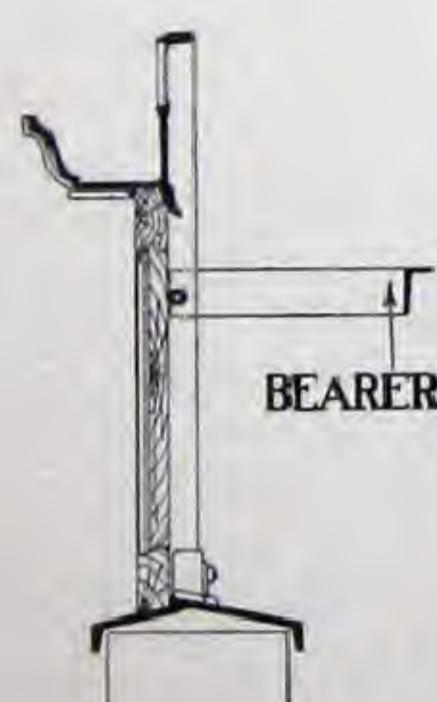


Type C



Type D

DESCRIPTION



Type E

- A**—Galvanized iron framed table with slate top for potted plants. They are indestructible. See lower illustration page 21 and upper illustration page 25.
- B**—Galvanized iron framed bed with porous tile bottom and slate sides, used where roses, carnations and other plants are planted directly in the soil. The most durable type of bed. See illustrations pages 9, 13 and 20.
- C**—Same as type "B" except the sides are cypress. See illustrations, pages 7 and 15 and lower illustration page 24.
- D**—Bed with cypress frame, bottoms and sides. Less expensive than types "B" and "C" but not so durable.
- E**—Shows bearer attachment used in side-wall constructions pages 49, 51 and 52.



Division of Work

Work which can be done by owner

IT is usually to the owner's advantage to employ local workmen for the work mentioned below. If, however, it is desired we will include this work in our estimate.

Cartage of materials shipped by us, from freight station to building site.

Grading, excavating and filling.

Masonry work and drains.

Bringing cold water supply to building.

In some cases to furnish materials for and erect the workroom.

Work which should be done by us

In order to obtain the best results, the materials for and labor erecting all other parts of the work should be furnished by us, consisting of greenhouse iron work, greenhouse wood work, hardware, ventilating machinery, plant tables and beds, painting, glazing, heating, plumbing for watering purposes, wiring, slat walks, vestibules, hoods, propagating beds, moss bank frames, wall ventilators, and any special features desired.

Working plans

After we are awarded the contract for the erection of the greenhouse, we furnish without charge complete working plans, specifications, and details for all parts of the work including those for the masonry work.

When materials only are desired

Where special conditions exist or in cases of great distance from our factory, it may be advisable for the owner to erect the work with local workmen, we furnishing the required materials ready to erect. In such cases we furnish without charge complete working plans and instructions for erection. It is always, however, to the owner's advantage that we send a skilled workman to superintend and assist in the erection.



General Construction Information



FOllowing is an outline description of the various parts of the work used in our greenhouse construction.

Detailed specifications are submitted with our estimates and any variations required to meet special conditions will be incorporated therein.

Grading, Excavating, Filling

Grading usually consists in removing the loose top soil and leveling the site.

Grading

Excavating consists of digging the cellar under workroom for boiler and storage of coal; trenches for foundation walls, or footings; drains, cold water supply, heating mains, piers for roof columns, heating pipes, and plant table supports.

Excavating

Where the site is not level or where it is necessary to replace loose soil, filling should be done with gravel, sand or subsoil, placed in courses not exceeding 6 inches in depth, each course thoroughly wetted and tamped to prevent settling.

Filling

Masonry work and Drains

Footings should extend below the frost line and the foundation walls carried above these footings to the required height to receive the superstructure. The footings and walls can be concrete, stone or brick.

Footings

and Walls

Brick or concrete piers for supporting the heating pipes, roof columns and bench legs, should extend to solid bottom.

Piers

There should be concrete walks about 4 inches thick with cement finish laid in blocks, crowned and edges rounded.

Walks

The trenches in which the heating mains are carried should have brick, concrete, or stone walls carried to solid footings and stone or other suitable covering where crossing walks or doorways.

Trenches

Bed for Sills	Best portland cement should be used for bedding the cast iron foundation sills on walls.
Door Sills	Can be cut stone or cement moulded.
Platforms	Can be cut stone or cement and should be placed at all outside doorways.
Cement Wash	The interior face of all exposed walls in greenhouses should receive two coats of cement wash.
Curb	A stone or cement curb is usually placed around the centre bed in palm houses extending about 6 inches above the walk level, with foundation carried to solid footing.
Cement Bottoms	In vineeries and nectarine houses, cement bottoms are usually provided over the entire area to confine the roots of the vines or trees and are graded to convey surplus water to drains.
Drains	In all houses where gutters are used, a system of tile or iron drains are required to dispose of roof water. The cement bottoms of vineeries or peach houses and the cellar floor should also be provided with drains.
Cellar	A cellar should be provided for the boilers and coal storage with window and door openings. There should be side and partition walls, cement floor, chimney with thimbles, cleaning door, and cap; coal chute, ash vault, and in cases where fireproof construction is desired, an iron beamed, masonry arched, cement finished floor over the cellar, also a stone or iron stairway leading to boiler room. The interior walls and ceiling should receive two coats of whitewash. Cellars are usually placed underneath workrooms.

Workroom

Design	These buildings are always designed to conform to the structure which they form a part or to surrounding buildings where architectural conformity is required.
Equipment	They vary from the simplest type of lean-to or even-span building, only large enough to allow space for a small potting bench, closet, pot rack and soil bins, having a cellar underneath for the boiler and a limited coal storage space; to more commodious buildings fitted with office for gardener, workroom furnished with potting benches, soil bins, sink, pot racks, seed closet, refrigerator, storage room for tools and supplies, and toilet room. The cellar being divided into compartments for the boilers, a season's coal supply, mushroom, root and cold storage rooms. In some cases these buildings are also designed with living rooms for the accommodation of the gardener's family or his assistants.

Greenhouse Ironwork

Foundation Sills	Cast iron sills are used to cap the foundation walls. They are bedded in cement and have flanges projecting over the edges of the walls. Are sloped on the upper surfaces to shed water, are joined with iron splice plates, and used in lengths of 8 feet 3 inches on all regular work. See pages 46 to 50 for their application.
Side Wall Sills	Cast iron sills are used to cap the siding, panel and sash ventilators as shown by side wall construction types "F," "G," and "H," pages 51, 52 and 53. They are flanged, joined with iron splice plates, and bolted to the U-Bars.



Cast iron gutters about 5 inches wide are used on the sides of the houses, and placed in the various positions indicated by sections and side wall constructions, pages 38 to 52. They are moulded on their outer surfaces, connected with cast iron brackets, bolted to the U-Bars, and used in lengths of 8 feet 3 inches in all regular work. They have outlets on the back for discharging rain water into drains placed inside of houses to prevent freezing. The backs of gutters are exposed to the inside temperature, thus preventing the accumulation of ice and snow. The gutters shown on palm houses, sections "O" and "P," pages 44 and 45, are 8 inches wide.

Side Wall Gutters

Iron gutters are used on the roofs over longitudinal partitions. For application of these gutters, see sections "J" and "K," pages 40 and 41, and type "B" ridge, page 54. They are bolted to the U-Bars and project to the underside of the ridge cap. Outlets are placed on the under side to discharge rain water into the leaders which are led down the vertical partition walls discharging into drains.

Galvanized iron or copper leaders are used for connecting gutter outlets to the leaders drains.

Angle iron purlins are used on the roofs where the slopes exceed 9 feet between supports. See sections "H," "I," "J," "K," "L," "M," pages 39 to 42. They are bolted to the U-Bars, joined with iron fittings, and act as gutters to receive the condensation from the roof bars.

Flat iron purlins are used on the sides of houses just below the curve. They are bolted to and act as spacers to tie the U-Bars.

Angle iron purlins are placed under the bottom rail of the roof sash. They are bolted to the U-Bars and act as gutters to catch the condensation which forms on the sash. Outlets are provided to carry the water from them discharging same on the upper side of the roof glass.

In dome houses angle iron plates are used to receive the main roof and dome bars to which they are bolted. See section "P," page 45.

In side wall constructions types "F," "G," "H," pages 51 to 53, iron ground posts are used to support the base angle. They have top and foot pieces and are bedded in concrete piers. Are bolted to the base angle and spaced about 8 feet 3 inches apart in all regular work.

In side wall construction, types "F," "G," and "H," pages 51 to 53, iron base angles are used. They extend along the sides, partitions and gables and receive the U-Bars to which they are bolted. They are secured to and supported by the ground posts described above.

The roof columns are iron pipe placed under the roof purlins or ridges requiring support. They have cast iron tops bolted to the purlins or ridge brackets and cast iron bases which are set in concrete footings. They are spaced 8 feet 3 inches apart.

Iron tie rods are used where necessary. They are connected to the U-Bars with iron fittings and are spaced 8 feet 3 inches apart.

The small size U-Bar, shown on page 35, is used in all sections except "N," "O," and "P," pages 43, 44 and 45. The large size U-Bars are used in these sections. They are bolted to the sills or base angles and extend in one piece from these members to the ridge or dome plate. They are bent to a 16-inch radius at the eaves in all standard work; in curved roof houses to curves as indicated on sections "N,"



"O," and "P," pages 43, 44 and 45. They are connected at the ridge, sill and dome plate with cast iron brackets and to the other members with bolts. They are spaced to receive 24-inch wide glass in all standard work.

Partition Cap

Channel iron caps are used at partitions. They are bolted to the underside of the roof bars and receive the partition bars.

Gable and Partition Members

Gables and partitions are provided with U-Bars, sills, ground posts, base angles and partition caps, stiffening and assembling members all conforming to the roof construction.

Special Parts

In houses requiring special members, they are detailed to conform to the other structural members.

Galvanizing

After shop fitting is done, all members, excepting the foundation sills, are thoroughly galvanized by the hot process to prevent rusting.

Cleaning

After galvanizing is done, they are gone over, smoothed off, cleaned and made ready for shipment.

Erection

All work is so carefully done in the factory that when erection is begun all members fit and bolt together perfectly, insuring a strong, rigid, durable frame.

Greenhouse Woodwork

Materials

All wood work is made from carefully selected, air dried, gulf cypress.

Machining

It is machined to the required shapes and skilfully fitted.

Ridges

Are rabbeted to receive the ventilating sash and are provided with cap and roll and firmly screwed to the ridge brackets.

Finials

Turned finials are placed at the terminal of each line of ridge at the gables.

Vent Header

A small vent header is placed against the iron vent purlin to receive the roof glass. It is secured to the purlin with screws.

Ridge Ventilating Sash

Are mortised and tenoned together and secured with steel dowels. The bars are spaced to conform to the roof bars. They are fastened to the ridge with three hinges to each sash, and the ends are joined together with galvanized steel battens screwed to the sash to insure tightness and true alignment when opened as ventilators. See page 54 for their application.

Side Ventilating Sash

Are made the same as the roof sash and battened together in the same manner, and secured to the gutters or sills with three hinges to each sash. See side wall construction pages 48, 50 and 53 for their application.

Side Ventilating Panels

Are made the same as side sash, excepting the openings are fitted with raised panels instead of glass. See side wall construction pages 49 and 52 for their application.

Base Boards

Are made from 2-inch by 10-inch stock. Are bolted to the U-Bars and base angles and are readily removable, so that in case of decay they can be easily replaced without disturbing any other members. See pages 51, 52 and 53 for their application.

Base Caps

Are used to cap the base boards and to receive the side ventilating sash or panels. They are grooved to fit over the base and have a shoulder on top against which the ventilators close. They are screwed to the U-Bars. For their application see pages 52 and 53.



Are used to receive the glass on the upper side and on the lower side are formed to cap the siding or ventilators. They are screwed to the U-Bars. For their application see pages 51 and 53.

Ventilator or
Siding Caps

The space between the base board and the sill or cap as shown by side wall construction, page 51, is filled with double boarding, the outer thickness extending longitudinally, the inner thickness vertically. Thick paper is placed between to insure warmth.

Siding

Are used as shown and described on pages 34 and 35. On curved portion of roofs they are cut from the solid block to prevent warping.

Core Bars

Door openings are provided with frames screwed to the U-Bars.

Door Frames

Doors have glass panels in the upper part and wooden panels in the lower part, are heavy and substantially made.

Doors

The U-Bars at the gables are capped with a member wide enough to receive the gable bars and glass.

Gable Caps

A core member is fitted in the iron partition cap to receive the partition bars and glass. It is screwed to the cap.

Partition
Core

In palm houses, vestibules and other structures requiring special members, such as transoms, facias, mullions, ornamental sash, etc. (where used to carry out an ornamental design) are specially detailed.

Special Parts

Hardware

Consists of brass butts, mortise locks with brass or bronze knobs and trimmings.

For Doors

Consists of galvanized iron butts with brass centres.

For Sash

Are of standard make galvanized.

Bolts and

Screws

Ventilating Machinery

The roof and side ventilating sash, the side ventilating panels and the wall ventilators are fitted with our special type of worm and gear ventilating machinery, which is thoroughly adjustable, self-locking, easy working and very durable.

The shafting is 1-inch pipe straightened, coupled and pinned.

Shafting
Hangers

The shafting is held in position with cast-iron hangers, bolted to the U-Bars at proper intervals.

Two arms, rods and sash bearers are provided for each sash or panel. The arms are cast iron, firmly secured to the shaft. The rods wrought iron riveted to the arms. The bearers cast iron riveted to the rods and screwed to the rail of the sash or panel.

Arms, Rods,
Bearers

Worm and gear machines are attached to the structure and shafting and are so arranged as to open each line of ventilators in each compartment independent of the others. They have roller bearings, turned worms and machined wearing surfaces.

Machines

Operating Rods	Operating rods are carried from the machines to the convenient points for operating and are fitted with hand wheels, mitre gears, U-Bar, column and bench attachments, and universal joints for changing the direction of the operating rods.
Hand wheels	
Mitre Gears	
Universal Joints	
Operating Chains	In certain cases, chains for operating the machines are preferable to rods and wheels, in which case they are used. See section "D" page 38 and lean-to portion of section "J" page 40.
Galvanizing	After all shop work is done on the various parts they are heavily galvanized by the hot process (excepting worms and gears) to prevent rusting.
Application	For the application of the ventilating machinery as variously applied, see pages 37 to 45.

Plant Tables and Beds

Tables	In palm houses, conservatories and houses intended for growing plants in pots, tables are used.
Beds	In rose, carnation and other houses where the plants are planted in the soil, beds are used.
Construction	All will be found illustrated and described on page 55.
Galvanizing	The iron work of the tables and beds is heavily galvanized with the hot process to prevent rusting.

Painting

1st Coat	The cast iron foundation sills are given one coat of red lead and oil before shipment. Wood work is given one coat of white lead and oil or oxide of iron and oil before shipment. After erection galvanized iron work exposed on the outside of houses is given a coat of white lead and oil.
Leaded Joints	During erection joints of the wood work are white leaded.
2nd Coat	After erection and before the glass is set, wood work and iron work outside of the houses and the wood work and cast iron foundation sills inside of houses are painted a coat of white lead and oil.
3rd Coat	After the glass is set, wood work and iron work outside of houses and wood work and cast iron foundation sills inside of houses are painted a finishing coat of white lead and oil.
Aluminum Finish	The interior iron work of the superstructure, excepting the cast iron foundation sills, is given a coat of aluminum paint after the glass is set and the putty beds are cleaned off. The ventilating machinery and the iron work of the plant tables are finished with a coat of aluminum.



Glazing

All glass used in our standard work is double thick, "A" quality. Standard roof **Glass** work is glazed with glass 24 inches wide. The curved glass at the eaves is 16-inch by 24-inch, bent to a 16-inch radius. In curved roof houses such as shown by sections "N," "O" and "P," pages 43 to 45, the glass is bent to fit the curves. All divisions in sash and doors are glazed with a single light of glass.

Roof glass is laid with lapped joints of about $\frac{1}{4}$ inch. In gables and vertical sides **Joints** the glass is butted and zinc members inserted between the lights to prevent slipping and to insure tightness.

Glass is bedded in putty made to our special formula and held in position with **Bedding** zinc glazing nails.

Heating

We recommend hot water heating in all ordinary work. It is durable, economical, **Method** simplest and easily cared for.

We use, unless otherwise desired, the standard $3\frac{1}{2}$ -inch internal diameter cast-iron **Pipe** greenhouse pipe in 9-feet lengths for coils. This pipe weighs about 11 pounds to the foot.

We also use the standard cast-iron greenhouse pipe fittings, such as elbows, tees, **Fittings and** bends, etc. Valves are especially manufactured to use with these fittings and pipe, **Valves** having cast iron bodies and brass mountings.

Automatic headers are placed at the highest points of coils for the discharge of air **Headers** in the pipes without the use of air cocks or open tanks.

An expansion tank (usually galvanized iron) is placed in the workroom or some **Expansion** convenient point near the boiler and connected to the heating system, so as to provide **Tanks** for the expansion of the water in the apparatus.

Coils proportioned for the required temperature in each compartment are placed **Coils** under benches or where required to evenly distribute the heat. They rest on iron chairs and are supported by masonry piers and valved for proper regulation.

Supply and return mains connect with coils and are carried to the boiler room **Mains** and there connected to the boiler.

We use the best sectional and round boilers made for greenhouse work. Ample **Boilers** power is always provided to insure easy and economical operation.

In cases where 2-inch pipe for hot water heating is desired or steam heating is **Special** preferred, we install these systems.

Plumbing for Watering Purposes

Galvanized iron pipe is used for the mains and branches.

Pipe

Brass compression hose bibbs are attached to the branches and located at convenient intervals to allow the gardener to reach all parts of the houses with short lengths of hose.

Faucets



Supply

The supply pipe is usually brought into the boiler cellar and is connected to the mains.

**For Vineries,
Peach and
Nectarine
Houses**

Vineries, peach and nectarine houses are provided with galvanized wire trellises, on which to train the vines and trees. See section "L," page 42, for the way in which we wire vineries. Section "M," page 42, for the way in which we wire peach and nectarine houses.

**For Rose,
Carnation,
Melon,
Cucumber,
Tomato
and Orchid
Houses**

Owing to the various ways which gardeners require wiring placed in such houses, we do not include this work in our estimates. We will, however, arrange to place same when desired.

**For Vineries,
Peach and
Nectarine
Houses**

In vineries, walks constructed with slats secured to stringers, made in short sections, so as to be removable, are provided. They are placed through the centre of the houses, with branches leading to the operating wheels of the ventilating apparatus. In peach and nectarine houses, similar walks are used, placed around the sides of the houses, with cross walks extending between the trellises.

Slat Walks

Vestibules

Are made to conform to the buildings which they are to join. See example "3," page 36, for vestibule on side of palm house and upper illustration, page 9, for one on side of greenhouse.

Hoods

With iron frames and supporting brackets are placed over gable doorways. They are glazed same as roofs. See example "1," page 36.

Propagating Beds

These are enclosed and provided with extra piping for bottom heat.



Moss Bank Frames

Frames for moss banks are provided when desired.

Wall Ventilators

Are built with iron frames fitted with cypress or metal-covered panels, hinged to the top of frame, and arranged to open outwards. For their application see side wall construction "B," page 47.



What Others Say

"Millbank," Greenwich, Conn.,
December 28, 1903.

Dear Sirs:

I wish to express my opinion of the U-Bar house you erected here last spring. It has given us the greatest satisfaction.

I consider that up to date, there is nothing in horticultural construction to compare with the U-Bar greenhouse, as it gives the greatest amount of light, strength and durability, at the same time it looks neater than any other style of house.

I may state that the house has been greatly admired by everyone interested in horticulture who has seen it.

I also wish to thank you for the painstaking way in which all the work was done, every small detail being carefully and promptly attended to.

Yours truly,

Robert Williamson
Supt. for Mrs. A. A. Anderson.



House erected for Mrs. A. A. Anderson.

What Others Say

"Beechwood," Scarborough, N. Y.

November 18, 1903.

Gentlemen:

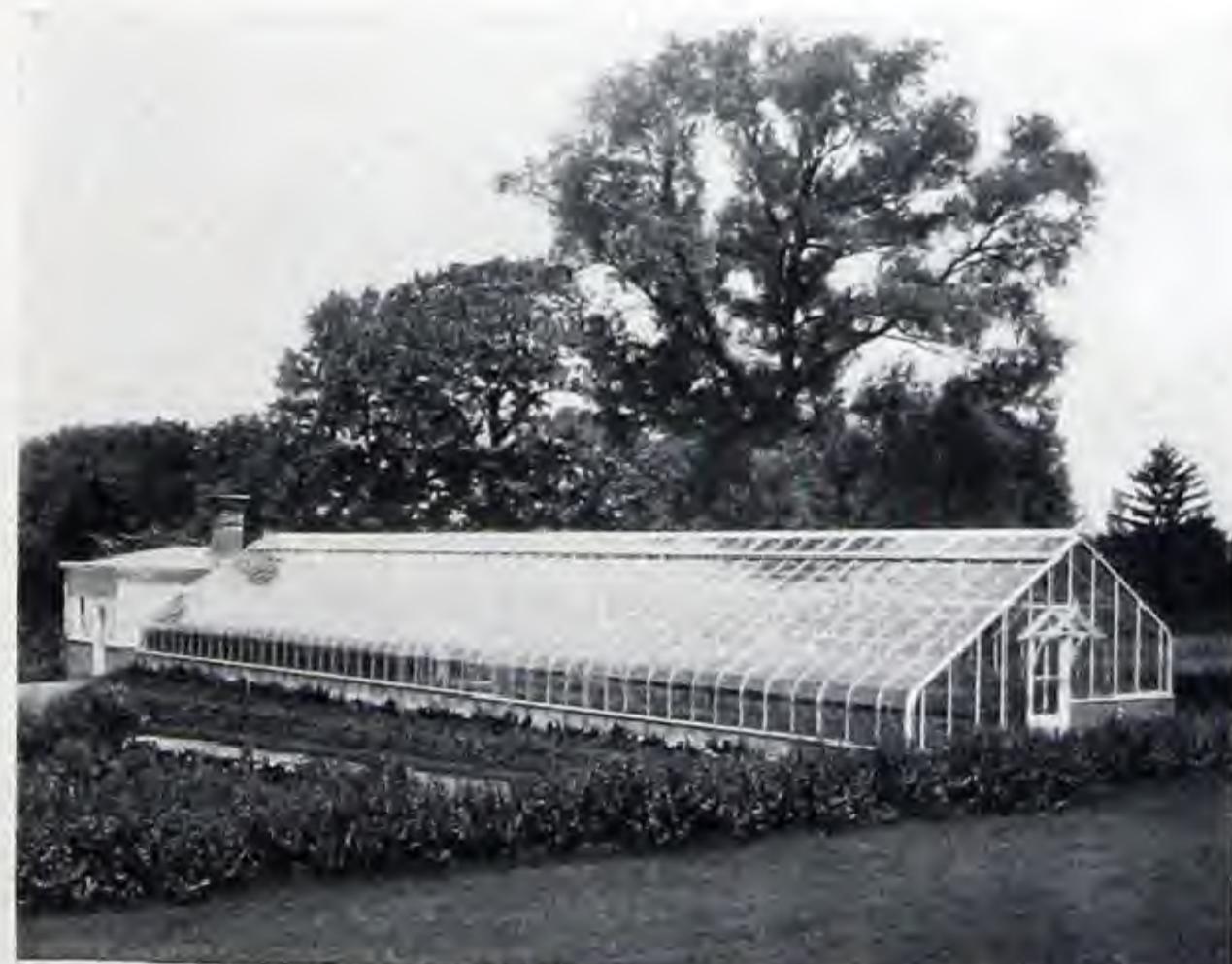
The hundred foot house erected by you last March is a great success, both for utility and from an architectural point of view.

I consider the U-Bar style of construction as far ahead of the ordinary iron frame as the ordinary iron frame surpassed the old wooden house with 8 x 10 glass.

My predictions are that all up-to-date horticulturists will demand this method of construction in the future.

David McFarlane

Gardener to Mrs. H. Walter Webb.



House erected for Mrs. H. Walter Webb.



What Others say

"Blantyre Gardens," Lenox, Mass.,
December 23, 1903.

Dear Sirs:

Regarding your inquiry as to my opinion of the range of greenhouses which you just completed on Mr. R. W. Paterson's place, I would say that it gives me pleasure to inform you that I am perfectly satisfied with them in every way.

The arrangement of the houses is about perfect and the work in every particular has been done in such a manner that it is perfectly satisfactory to me and a credit to the builders.

So far as the style of construction is concerned, I believe that your "U"-Bar type is as much superior to the very best type of the ordinary iron frame construction as the iron frame houses are to the old wooden sash bar houses.

The light we get is perfect and the growing capacity of the houses, seems to me, to be beyond anything I have ever experienced.

I would say finally, the work throughout in every particular, is most satisfactory.

Thomas Proctor

Supt. for R. W. Paterson, Esq.



Range erected for R. W. Paterson, Esq.

For description of this range see pages 22 to 25.



What Others Say

Montreal, January 19, 1903.

Gentlemen:

We are exceedingly well pleased with the house, it is the neatest and best construction that we have seen for greenhouse purposes.

Yours truly,

E. & W. Maxwell.



House erected for R. B. Angus, Esq., St. Anne de Bellevue, Canada.
E. & W. Maxwell, Architects.



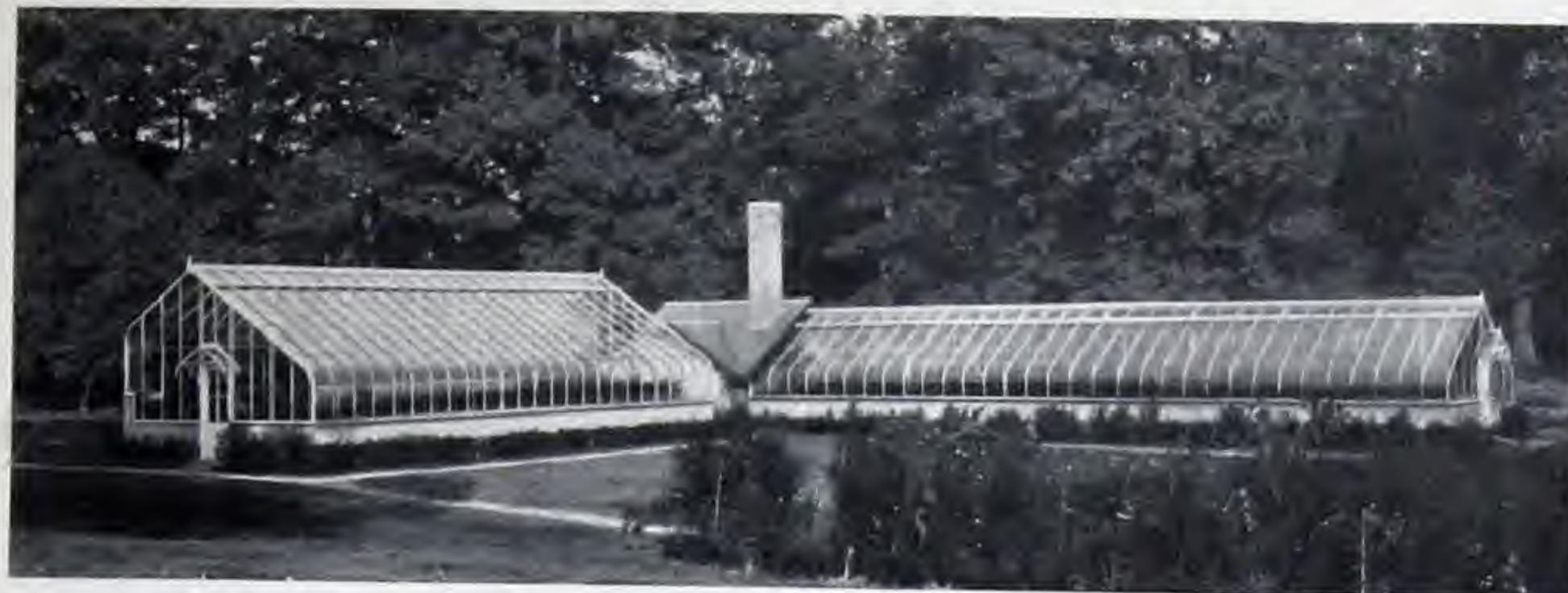


How to Obtain Estimates

ACCOMPANYING the catalogue is an application for estimate blank, which if filled out and mailed will enable us to furnish plans, specifications, and estimate of cost covering the work contemplated; or when desired, we will send a competent representative to confer with the owner or his representatives.



Interior of palm house shown on page 21
after being stocked.



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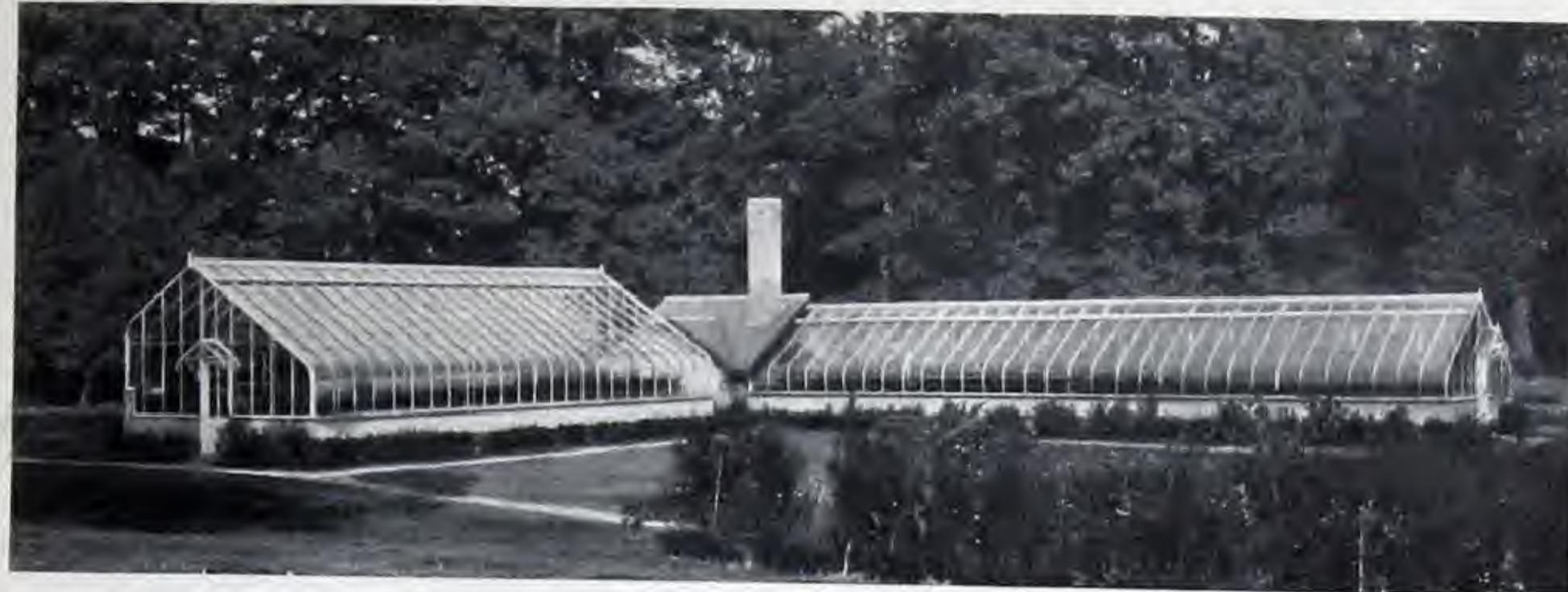


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